
TAXONOMIC STUDY OF *GYMNOPOGON* (POACEAE, CHLORIDOIDEAE, CYNODONTEAE)¹

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ABSTRACT

The present paper includes a taxonomic revision of the genus *Gymnopogon* P. Beauv. (Poaceae, Chloridoideae, Cynodonteae), with a total of 14 species treated in this work, including more than 40 synonyms. The genus includes perennial, occasionally annual, species, with erect to decumbent culms, ligules membranous-ciliate, blades conspicuously distichous, inflorescences with spikelets on racemiform branches, spikelets laterally compressed, 1- to 4-flowered, glumes 1-nerved, lemma 3-nerved, awned. Species distributions are mostly American, with one Asian species. A description of morphological characters, key to identify the species, descriptions, synonymy, geographical distribution, and illustrations of characters of taxonomic value are also included. The name *Chloris delicatula* C. B. Clarke ex Hook. f. ($\equiv$ *Gymnopogon delicatulus* (C. B. Clarke ex Hook. f.) Bor) is lectotypified.

RESUMEN

El presente trabajo consta de una revisión taxonómica de las especies del género *Gymnopogon* P. Beauv. (Poaceae, Chloridoideae, Cynodonteae). En este manuscrito se trata un total de 14 especies, incluyendo más de 40 sinónimos. El género incluye especies perennes, ocasionalmente anuales, con tallos erectos a decumbentes, lígulas membranáceo-ciliadas, láminas conspicuamente dísticas, inflorescencias con espiguillas sobre ramas racemiformes, las espiguillas lateralmente comprimidas, 1- a 4-floras, glumas 1-nervias, lemma 3-nervia, aristada. En lo que se refiere a la distribución geográfica, las especies son mayormente americanas, con una especie asiática. Se incluye la descripción de caracteres morfológicos, una clave para identificar las especies, descripciones, sinonimia, distribución geográfica e ilustraciones de los caracteres de valor taxonómico. Asimismo, se ha designado un lectotipo para *Chloris delicatula* C. B. Clarke ex Hook. f. ($\equiv$ *Gymnopogon delicatulus* (C. B. Clarke ex Hook. f.) Bor).

Key words: Chloridoideae, Cynodonteae, *Gymnopogon*, Poaceae.

The genus *Gymnopogon* P. Beauv. (Poaceae) was established by Palisot de Beauvois in 1812, on the basis of *Andropogon ambiguus* Michx. *Gymnopogon* belongs, within subfamily Chloridoideae, to tribe Cynodonteae Dumort., which includes taxa with spiciform geminate racemes; spikelets subsessile or sessile, unilaterally distributed in one or two series along the rachis of the racemes; 1-flowered spikelets, exceptionally with more florets; the rachilla generally disarticulated above the glumes; the glumes, lemmas, and paleae membranous; and the lemmas 3-nerved, awnless, mucronate, or 1- to 3-awned. Within this tribe, *Gymnopogon* is related to *Chloris* Sw., as both genera share a rachilla extension behind the upper developed floret, spikelets usually with one fertile

floret, and the lemmas awnless or with a subapical awn. *Chloris* differs by its inflorescences arranged in terminal digitate clusters, rarely with one or more branches below; spikelets densely imbricate along the rachis; and the glumes equal to or shorter than the floret. Moreover, the genus *Chloris* does not present conspicuously distichous leaves along the culms as can be found in *Gymnopogon*.

Gymnopogon has been scarcely scrutinized in regional or partial treatments, with the exception of the revision published by Smith (1971), who recognized 13 species, one subspecies, and one form. *Gymnopogon* has been considered only in regional floras: Hitchcock (1930) cited two species for Central America: *G. aristiglumis* Hitchc. and *G.*

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fastigiatus Nees. Swallen (1955) reported *G. spicatus* (Spreng.) Kuntze for Guatemala, and Bor (1960) mentioned the unique Asian species, *G. delicatulus* (C. B. Clarke ex Hook. f.) Bor, from Myanmar (Burma) and India. Burkart (1969) mentioned two species for Entre Ríos, Argentina: *G. spicatus* and *G. biflorus* Pilg. [= *G. spicatus*]. Rosengurtt et al. (1970), when treating the grasses of Uruguay, included four species for the genus: *G. burchellii* (Munro ex Döll) Ekman, *G. grandiflorus* Roseng., B. R. Arill. & Izag., *G. legrandii* Roseng., B. R. Arill. & Izag., and *G. biflorus*. Caro (1982) described a new species, *G. glaber* Caro. Boechat and Valls (1990b) studied *Gymnopogon* for Brazil and included in their revision seven species, among them *G. doellii* Boechat & Valls, endemic to that country. Davidse et al. (1994) treated three species for Mesoamerica: *G. spicatus*, *G. fastigiatus* subsp. *fastigiatus*, and *G. aristiglumis*. Renvoize (1998), in his account of the grasses of Bolivia, cited three species for the country: *G. burchellii*, *G. fastigiatus*, and *G. spicatus*. Smith (2003) mentioned three species for the *Flora of North America*: *G. brevifolius* Trin., *G. ambiguus* (Michx.) Britton, Sterns & Poggenb., and *G. chapmanianus* Hitchc. Finally, Sulekic and Rúgolo de Agrasar (2006) described a new species of *Gymnopogon* from Argentina and provided a key to distinguish the northwestern species of the genus in that country.

Pilger (1956) considered two sections in the genus: section *Gymnopogon*, which included species with a pilose callus, and section *Monochaete* (Döll) Pilg., which included *G. fastigiatus* and *G. jubiflorus* Hitchc., the latter section characterized by including species with a glabrous callus. Originally, Döll (1878) defined section *Monochaete*, with a single species, *G. fastigiatus*, by not having the rachilla prolonged into an awn, but this character is not useful to delimit infrageneric boundaries in *Gymnopogon*.

Gymnopogon is principally defined by its distichous leaves; the inflorescences with long, spiciform branches; the axis of the branches naked toward the base; and the spikelets laterally compressed, 1- to 4-flowered, with the lemma awned. Within the genus, its species can be distinguished by morphological characters, such as the rhizome shape in perennial species; the length of spiciform racemes; whether floriferous or naked at the base; awned or awnless glumes, lemmas, and rachilla, with the latter with one or more awnlike rudiments at the apex; and the floret size.

Gymnopogon comprises 14 species and two subspecies, all distributed in the Americas, with the exception of *G. delicatulus*, an Asian species. In this paper, we present a taxonomic account of the

entire genus, based on exomorphological, vegetative, and reproductive characters; provide a key to identify species and subspecies; include associated synonymies; and consider geographical distributions, descriptions, and illustrations of taxonomically valuable features for all recognized taxa within the genus.

MATERIAL AND METHODS

This study was based on the morphological analysis of almost 300 herbarium specimens, including type material when available or digital images when these specimens could not be loaned for study. Examined specimens were from the following herbaria, cited according to abbreviations from Holmgren et al. (1990): BA, BAA, BAB, BM, CEN, CORD, CTES, G, IBGE, ICN, K, LE-TRIN, LPB, MO, MVFA, NY, SI, and US. The institutions that kindly supplied digital images of the type material were: CEN, G, Board of Trustees of RBG Kew (K), MVFA, P, and US. A list of examined specimens is provided in Appendix 1.

TAXONOMIC TREATMENT

Gymnopogon P. Beauv., Ess. Agrostogr. 41, 164. 1812. TYPE: *Andropogon ambiguus* Michx. [= *Gymnopogon ambiguus* (Michx.) Britton, Sterns & Poggenb.].

Anthopogon Nutt., Gen. N. Amer. Pl. [Nuttall] 1: 81. 1818, nom. illeg. superfl. TYPE: *Andropogon ambiguus* Michx.

Biatherium Desv., Mém. Soc. Agric. Angers 1: 172, t. 8, f. 2. 1831. *Biatherium foliosum* (Willd.) Desv., Mém. Soc. Agric. Angers 1: 176, t. 8, f. 2. 1831.

Doellochloa Kuntze, Revis. Gen. Pl. 2: 773. 1891, nom. illeg. superfl. TYPE: *Doellochloa fastigiata* (Nees) Kuntze [= *Gymnopogon fastigiatus* Nees].

Monochaete Döll, Fl. Bras. (Martius) 2(3): 78. 1878. *Gymnopogon* sect. *Monochaete* (Döll) Pilg., Nat. Pflanzenfam., ed. 2 [Engler & Prantl] 14d: 94. 1956. Based on *Monochaete fastigiata* (Nees) Döll, Fl. Bras. (Martius) 2(3): 79. 1878.

Caespitose or rhizomatous perennials, with short rhizomes, occasionally annuals; culms erect to decumbent, rigid, simple or scarcely branched at the base, internodes terete; nodes slightly thickened or narrowed. Leaf sheaths usually longer than the internodes, striate, strongly overlapping, pilose or glabrous; ligules membranous-ciliate; blades lanceolate to linear-lanceolate, conspicuously distichous, flat, convolute or involute, narrowed or subcordate at the base, the apex apiculate. Inflorescence terminal, open, with several spreading racemes on alternate or opposite branches, axis of the branches naked at the base or floriferous throughout, triquetrous, scabrous,

with appressed, alternate spikelets toward the apex, main axis ending in a raceme. Spikelets shortly pedicellate, laterally compressed, tight against the rachis, 1- to 4-flowered with 1 to 2 lower perfect florets and 1 or 2 neuter or reduced upper florets; rachilla articulated above the glumes. Glumes 2, longer than the florets, 1-nerved, the nerve scabrous, acuminate; lemma 3-nerved, pubescent or glabrous, lateral nerves proximal to the margins, the apex acute or minutely bifid, aristate, the awn straight, usually longer than the bracts of the spikelet, occasionally muticous; palea membranous, 2-nerved; rachilla prolonged beyond the upper floret, ending in an awn; stamens 3, occasionally 2; lodicules 2, cuneate; gynoecium with 2 styles and 2 plumose stigmas. Caryopsis fusiform, hilum punctiform, embryo 1/3 or less the length of the caryopsis.

Distribution. *Gymnopogon* is a genus with 14 species, mostly from the New World, distributed from the United States to Argentina, with one species in the Old World (*G. delicatulus*). Species of *Gymnopogon* are of low forage value and are found in tropical and temperate areas, usually on dry and sandy soils. According to Parodi (1919), these chloridoid grasses contribute to the establishment of natural prairies.

KEY TO THE SPECIES OF *GYMNOPOGON*

- 1a. Glumes awned or with a short awnlike acumen 0.5 mm or longer in both or one of the glumes.... 2
- 1b. Glumes awnless 3
- 2a. Glumes with an awn 3–7(–15) mm; main axis of the inflorescence 15–20 cm; lemma of the lower floret sparsely villous toward the margins, otherwise glabrous; collar glabrous 2. *G. aristiglumis*
- 2b. Glumes acuminate or with an awn 0.5–2.5(–3) mm; main axis of the inflorescence 9–16 cm; lemma of the lower floret usually pilose in the dorsal portion and margins; collar densely villous all over or only at the margins..... 13. *G. spicatus*
- 3a. Lemma and rachilla awnless 4. *G. burchellii*
- 3b. Lemma and rachilla awned 4
- 4a. Branches of the inflorescences with developed or reduced spikelets from the base..... 5
- 4b. Branches of the inflorescences without spikelets at the base..... 11
- 5a. Plants perennial with stoloniform rhizomes..... 12. *G. legrandii*
- 5b. Plants annual or perennial with short and thickened rhizomes..... 6
- 6a. Lemma awn (1–)1.5(–2) mm, occasionally awnless, but with the rachilla always ending in an awnlike rudiment 0.8–3 mm... 5. *G. chapmanianus*
- 6b. Lemma awn (3–)4.5–33 mm..... 7
- 7a. Lower, or unique in single-flowered spikelets, floret 1.4–2.3 mm 8
- 7b. Lower, or unique, floret 2.4–4(–5.5) mm..... 10
- 8a. Apex of the rachilla ending in an awnlike rudiment up to 0.5 mm; lemma with hairs 0.3–2

- mm at the distal 1/3 of the margins; lemma awn hygroscopic; perennial plants..... 8. *G. fastigiatus*
- 8b. Apex of the rachilla ending in 2(3) awnlike rudiments 3.8–15 mm; lemma glabrous or with hairs 0.1–0.3 mm; lemma awn not hygroscopic; annual plants 9
- 9a. Lemma 1.6–2.3 mm, glabrous, with a subapical awn (7–)8.5–23 mm; Caribbean and northern South America 9. *G. foliosus*
- 9b. Lemma ca. 1.4 mm, with whitish hairs 0.1–0.3 mm at the margins and scattered on the base, mainly on the middle nerve; southern Asia..... 6. *G. delicatulus*
- 10a. Lemma awn 7–12 mm; callus subglabrous; floret 2.4–3.1 mm; Brazil..... 7. *G. doellii*
- 10b. Lemma awn 5–6 mm; callus villous; floret 3–4 mm; central and southeastern United States and Caribbean..... 1. *G. ambiguus*
- 11a. Lemma awn (18–)24–25(–33) mm; ligules 0.5–0.8 mm 14. *G. toldensis*
- 11b. Lemma awn 1–9(–12) mm; ligules 0.1–0.5 mm 12
- 12a. Lemma awn 1–2 mm; surface of the lemma with short hairs on the middle nerve and toward the margins, sometimes scattered on the whole surface..... 3. *G. brevifolius*
- 12b. Lemma awn 5–9(–12) mm; surface of the lemma glabrous or with scarce short hairs scattered on the basal portion 13
- 13a. Lemma of the lower floret 3.5–4(–5.5) mm, generally with short hairs; lower glume 3.5–5 mm, upper glume 4.5–5.5 mm ... 11. *G. grandiflorus*
- 13b. Lemma 2–3 mm, glabrous; lower glume 3–3.5 mm, upper glume 4–4.5 mm 10. *G. glaber*

SPECIES TREATMENT

- 1. *Gymnopogon ambiguus*** (Michx.) Britton, Sterns & Poggenb., Prelim. Cat. 69. 1888. Basionym: *Andropogon ambiguus* Michx., Fl. Bor.-Amer. (Michaux) 1: 58. 1803. *Gymnopogon racemosus* P. Beauv., Ess. Agrostogr. 41, 164, t. 9, fig. 3. 1812, nom illeg. superfl. TYPE: [United States]. “In sabulosis Carolinae,” s.d., A. Michaux s.n. (holotype, P not seen, P photo at SI!; isotype, P not seen, P photo at SI!). Fig Gen. N. Amer. Pl. [Nuttall] 1: 82. 1818, nom. inval., pro syn. *Gymnopogon racemosus* P. Beauv.
- Gymnopogon scoparius* Trin., Gram. Unifl. Sesquifl. 237. 1824. TYPE: United States. “V. Sp. e New Jersey, Nov. Coesar,” 1835, A. Gray s.n. (holotype, LE-TRIN-2123.01!).
- Alloiatheros ambiguus* (Michx.) Elliott ex Kunth, Enum. Pl. [Kunth] 1: 284. 1833. *Alloiatheros ambiguus* Elliott ex B. D. Jacks., Index Kew. 1: 83. 1893, nom. inval., pro syn. *Gymnopogon racemosus* P. Beauv.
- Alloiatheros lepturoides* (Nutt.) Steud., Nomencl. Bot. [Steudel] ed. 2: 55. 1840, nom. inval., pro syn. *Gymnopogon racemosus* P. Beauv.
- Stipa expansa* Willd. ex Steud., Nomencl. Bot. [Steudel] (ed. 2) 2: 643. 1841, nom. inval., pro syn. *Gymnopogon racemosus* P. Beauv.



Figure 1. *Gymnopogon ambiguus*. —A. Habit. —B. Portion of the rachis with spikelets. —C. Spikelet. —D. Floret, dorsal view. —E. Floret, ventral view. A–E drawn from *Williamson s.n.* (NY).

Plants perennial, shortly rhizomatous, rhizomes 1.5–2 cm, from which several aerial culms develop; culms 20–100 cm, 1–1.2 mm diam., terete, robust, tufted, simple, erect or decumbent and geniculate; internodes yellowish to brownish, somewhat thickened toward the nodes, longitudinally striate, glabrous; nodes brownish, glabrous; floriferous culms terete, glabrous, striate and hispid toward the apex. Basal sheaths longer than the

internodes, the upper ones shorter, striate, yellowish to brownish, glabrous, with smooth and glabrous margins; ligules 0.1–0.2 mm, membranous-ciliate; pseudoligule, a few macrohairs ca. 1 mm; collar conspicuous, yellowish or brownish, strongly narrowed and with long hairs toward the margins; blades lanceolate, rarely oblong, 4–5.5(–9) × 0.3–0.7(–1.5) cm, distichous, ascendent or divergent, convolute or flat, broadly



Figure 2. *Gymnopogon aristiglumis*. —A. Habit. —B. Spikelet. —C. Glumes. —D. Spikelet detached from glumes. A–D drawn from Calderón 2072 (NY).

subcordate, acute, longitudinally striate and glabrous on both surfaces, the margins scabrous. Inflorescence of (8 to)15 to 25(to 36) spiciform racemes, 10–20(–29) cm, ascending or divergent, alternate; main axis triquetrous, (6–)10–15(–25) cm, glabrous, the angles scabrous; rachis of the racemes triquetrous, ca. 0.2 mm wide, straight, yellowish to brownish, glabrous, with scabrous angles, floriferous from the base, with basal spikelets developed or reduced. Spikelets fusiform, laterally compressed, 4.5–5.5 mm, 1-flowered, rarely 2-flowered,

tight against the rachis, sessile, alternate and distant in 2 series along the rachis; pedicels 0.4–0.5 mm, scabrous. Glumes subequal, 4–5.5 mm, longer than the floret, membranous, yellowish to brownish, 1-nerved, slightly indurated, awnless, glabrous, scabrous along the nerve; floret shortly stipitate, callus near 0.2 mm, villous; lemma membranous 3–4 mm, 3-nerved, the lateral nerves inconspicuous near the margins, minutely bifid at the apex, yellowish, pilose toward the margins, otherwise glabrous, with a subapical, straight awn 5–6

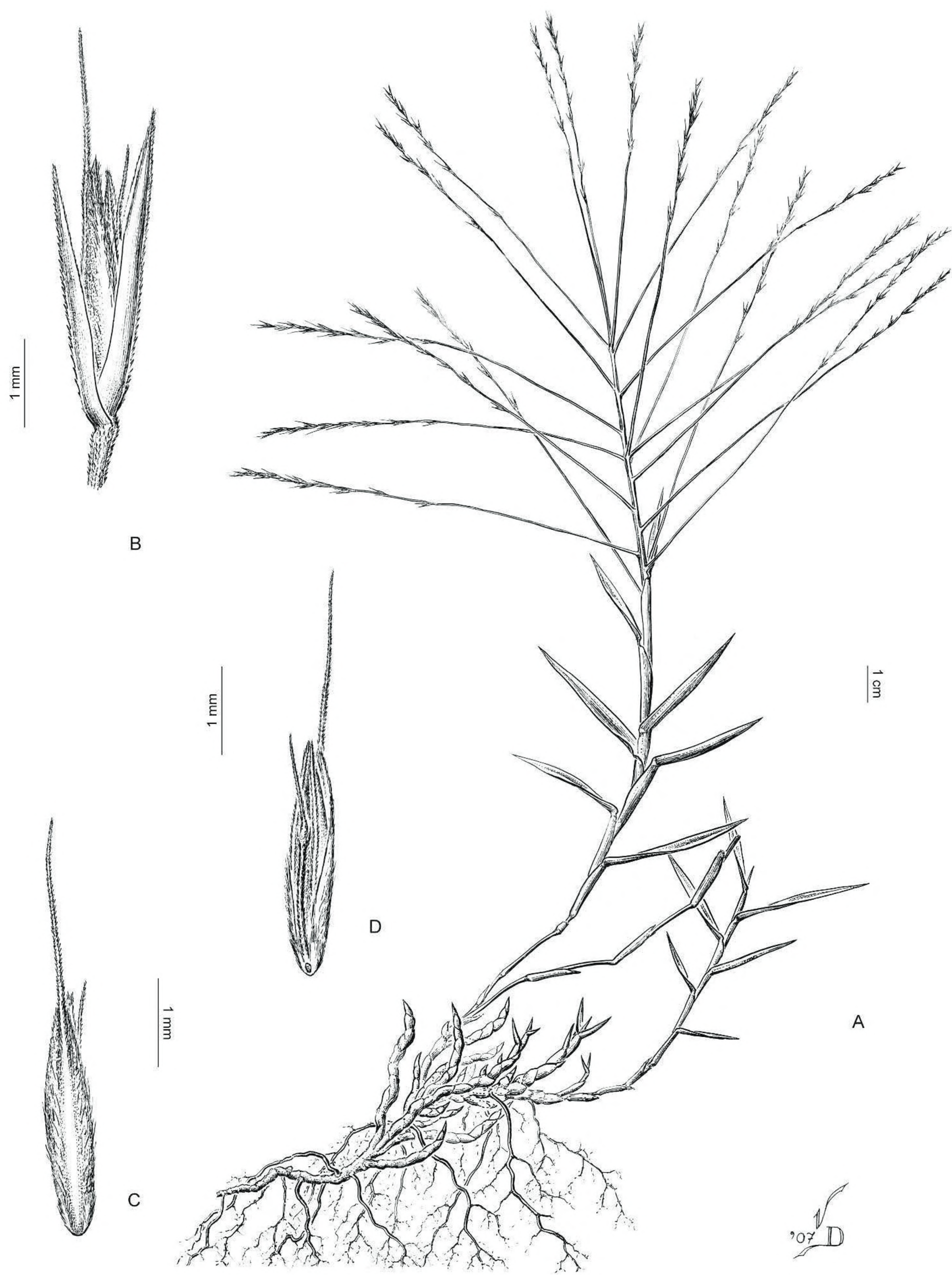


Figure 3. *Gymnopogon brevifolius*. —A. Habit. —B. Spikelet. —C. Floret, dorsal view. —D. Floret, ventral view. A–D drawn from *Thomas 103070* (NY).

mm, scabrous; palea membranous, pale, 2-nerved, ca. 1.8 mm, sparsely pilose at the apex, otherwise glabrous; rachilla extended behind the floret, terete, ca. 1.5 mm, glabrous, its apex bearing an awnlike rudiment ca. 4.5 mm, geniculate near its base, scabrous. Caryopsis fusiform, $2.2\text{--}2.3 \times 0.3\text{--}0.4$ mm; embryo less than 1/3 the length of the caryopsis, hilum basal, punctiform.

Distribution and habitat. *Gymnopogon ambiguus* is found in the central and southeastern United States to the Caribbean, in Haiti and the Dominican Republic. It is frequent in dry, sandy soils in pine woods, from sea level to 1600 m. The taxon has been observed to flower between August and November.

Observations. *Gymnopogon ambiguus* is similar to *G. doellii*, as they share inflorescence branches floriferous from the base, with spikelets 2.4–5.5 mm. *Gymnopogon doellii* can be distinguished by its smaller florets (2.4–3.1 mm vs. 4.5–5.5 mm in *G. ambiguus*), with a subglabrous callus (vs. villous), glumes 5.1–9.6 mm (vs. 4–5.5 mm) and lemma awns 7–12 mm (vs. shorter ones, 5–6 mm in *G. ambiguus*). The distribution range of both species also differs: *G. ambiguus* is the most frequent species collected in the United States, while *G. doellii* is restricted to southeastern Brazil.

Some specimens of *Gymnopogon ambiguus* have been confused with *G. chapmanianus*; both species have large spikelets, but in *G. chapmanianus* they are 2(to 3)-flowered, making the spikelets appear wider and the glumes open. *Gymnopogon chapmanianus* is found in the southern United States.

Representative specimens examined. DOMINICAN REPUBLIC. **Barahona:** Trail betw. Pedernales & Aceitil, *Howard 8138* (BM). HAITI. Mornes des Commissaires, *Holdridge 1215* (NY), *1715* (BM). U.S.A. **Alabama:** Sandy rise in Choctawhatchee bottoms by Ala. 85, S of Daleville, *Kral 69705* (BM). **Arkansas:** Miller Co., along Ark. 237 & in cemetery of Macedonia Baptist Church, 0.7 mi. N of Ark. 160 NW of Doddridge, *Thomas et al. 151215* (NY). **Florida:** Braidenton, *Tracy 7766* (BM); Dunedin, *Tracy 7764* (BM, NY). **Georgia:** Elbert Co., Stinchcomb Church rd., *Coile 1582* (BM). **Indiana:** Daviess Co., 5 mi. S of Plainville, *Potzger 10649* (NY). **Kansas:** Sandy woods, Chautauqua Co., *Hitchcock 906* (NY). **Kentucky:** Dry fields in Croppie Hollow Development, on Ky. 614, *Athey 2186* (NY). **Louisiana:** Kisatchie Natl. Forest, compart. 48, stand 7, *Thomas 147645* (NY); at Sizemore pond area, Jackson-Bienville Refuge, *McArdle 424* (BAA). **Maryland:** Salisbury, *Canby 14981* (BM); Great Falls, *Ball 80* (NY). **Mississippi:** Holmes Co., *McGee 1384* (NY). **Missouri:** Montan Mo., *Bush 7883* (NY). **New Jersey:** Burlington Co., 1.5 mi. NW of Green Bank, *Koster C5206-1* (BM). **North Carolina:** Madison Co., sandy soil near Paint Rock, *Biltmore 475c* (NY). **Ohio:** Jackson Co., *Pontious & Bartley 34* (NY). **Oklahoma:** Sapulpa, *Bush 1340* (NY). **Philadelphia:** s. loc., s.d., *Nuttall s.n.* (BM). **South Carolina:** Berkeley Co., Santee Canal, 5 mi. W of Pineville, *Godfrey & Tryon 1597* (NY). **Tennessee:** Barrens at Tullahoma, Aug. 1886, *Gatingen s.n.* (NY). **Texas:** Beckville, 1902, *Reverchon s.n.* (BM); Jasper Co., U.S. 96, 4.5 mi. S of jct. Texas 146 at Brookeland, *Smith 2474* (BM). **Virginia:** Caroline Co., Royal Fort Fost, *Walker 3222* (BM). **Washington D.C.:** Deanwood, *Hitchcock 660* (NY); in woods on Bunker Hill, Brookland, *Holm s.n.* (NY).

2. *Gymnopogon aristiglumis* Hitchc., Proc. Biol. Soc. Washington 40: 82. 1927. TYPE: El Salvador. Rosario, Jan. 1924, *S. Calderón 1924* (holotype, US 1169956, US photo at SI!; isotype, BAA 1376!). Figure 2.

Caespitose perennials, rhizomatous, rhizomes 1–1.5 cm, from which several culms develop; culms 70–

100 cm, 1 mm diam., terete, slender, simple and decumbent, slightly geniculate at the basal nodes; internodes yellowish to brownish, smooth, glabrous; nodes brownish, slightly thickened, glabrous; floriferous culms terete, longitudinally striate at the apex, glabrous. Sheaths shorter than the internodes, longitudinally striate, yellowish, the margins hyaline and villous toward the apex; ligule membranous-ciliate, 0.1–0.3 mm; pseudoligule, when present, a group of hairs up to 1.5 mm; collar conspicuous, yellowish to brownish, strongly narrowed, glabrous; blades narrowly lanceolate, 4–8(–9) × 0.3–0.5(–1.1) cm, ascendent or divergent, subcordate at the base, acuminate, flat, the margins involute toward the apex, longitudinally striate, glabrous on both surfaces, occasionally the adaxial surface villous at the base and toward the margins, the margins scabrous. Inflorescences partially included in the apical sheath, with 14 to 20 spiciform racemes, (13–)15–20(–40) cm, ascending or divergent, alternate or opposite; main axis 15–20 cm, longitudinally striate, glabrous, the angles scabrous; rachis of the racemes triquetrous, 0.2–0.3 mm, straight, yellowish, the angles scabrous, floriferous from the base, with basal spikelets often reduced to the awned glumes and 1 or 2 awned lemmas. Spikelets fusiform, laterally compressed, 2.3–3 mm, 1- or 2-flowered, tight against the rachis, subsessile, loosely disposed in 2 series along the rachis; pedicels 0.7–0.9 mm, slightly flattened, scabrous. Glumes subequal, 2.3–3 mm, longer than the florets, membranous, violaceous, 1-nerved, glabrous, scabrous along the nerve, with a subapical straight awn 3–7(–15) mm; lower floret shortly stipitate, callus terete, ca. 0.5 mm, glabrous; lemma membranous 2–2.5 mm, 3-nerved, sparsely villous toward the margins, otherwise glabrous, shortly bipartite and laciniate at the apex, with a subapical awn 8–20 mm, straight or slightly geniculate, yellowish to violaceous, hispidulous; palea membranous, equal to the lemma, 2-nerved, shortly laciniate at the apex, glabrous or sparsely pilose; upper floret, when present, similar to the lower one but smaller; rachilla prolonged behind the floret, terete, 1–1.5 mm, scaberulose, the apex ending in an awnlike scabrous rudiment ca. 9 mm. Caryopsis fusiform, 1.7–2.5 mm.

Distribution. *Gymnopogon aristiglumis* has been collected in El Salvador (Cerro San Jacinto, Rosario) between the months of July and November. Smith (1971) cited this species for the department of Santa Cruz in Bolivia, without mentioning any specimens from this country. However, Renvoize (1998) did not include *G. aristiglumis* among the species present in Bolivia.

Observations. *Gymnopogon aristiglumis* and *G. spicatus* share the presence of awned glumes. They differ by the different lengths of the awns, 0.5–2.5(–3) mm in *G. spicatus*, but longer in *G. aristiglumis*, ranging from 3–7(–15) mm.

Representative specimens examined. EL SALVADOR. Cerro de San Jacinto, Nov. 1923, *Calderón* 2072 (NY); San Salvador, July 1922, *Calderón* 949 (NY).

3. *Gymnopogon brevifolius* Trin., Gram. Unifl. Sesquifl. 238. 1824. *Anthopogon brevifolius* Nutt. ex Trin., Gram. Unifl. Sesquifl. 238. 1824, nom. inval. pro syn., *Gymnopogon brevifolius* Trin. TYPE: United States. Delaware: s. loc., *Digyn s.n. ex Bernhardt herb.* (holotype, LE-TRIN 2118.01 not seen, LE-TRIN photo at SI!; isotype, MO [2!]). Figure 3.

Anthopogon filiformis Nutt., Trans. Amer. Philos. Soc., n.s., 5: 152. 1837 [1835], as “*filiforme*.” TYPE: United States. Arkansas: “in shrubby prairies near the banks of the Arkansas,” Apr. 1818, *T. Nuttall s.n.* (holotype, BM not seen; isotype, PH not seen).

Gymnopogon racemosus P. Beauv., Ess. Agrostogr. 41, 164, t. 9, f. 3. 1812, nom. illeg.

Gymnopogon racemosus P. Beauv. var. *filiformis* Chapm., Fl. South. U.S. 556. 1860, nom. inval.

Plants perennial, rhizomatous, rhizomes thin and extended, up to 9 cm, branched, yellowish; culms 1–1.5 mm diam., terete, slender, simple, usually decumbent, erect; internodes yellowish to brownish, inconspicuously striate, glabrous; nodes slightly enlarged, yellowish to brownish, glabrous; floriferous culms terete, brownish, inconspicuously striate, glabrous. Sheaths shorter than the internodes, longitudinally striate, brownish, glabrous, the margins smooth and glabrous, scabrous to villous toward the collar; ligules membranous, 0.1–0.3 mm, the margins densely ciliate; pseudoligule a ring of long hairs, or absent; collar yellowish, conspicuously narrowed, villous at the margins, otherwise glabrous; blades linear-lanceolate, $2\text{--}6 \times 0.25\text{--}0.5\text{--}0.8$ cm, distichous and rigid, ascendent or divergent, convolute, involute or flat, conspicuously cordate or truncate at the base, acute, longitudinally striate and glabrous on both surfaces, the margins hispidulous. Inflorescence of (7 to) 11 to 12(to 30) divergent spiciform racemes, 9–18 cm, alternate or opposite; main axis triquetrous, 8–10 cm, longitudinally sulcate, brownish, glabrous, the angles hispidulous; rachis of the racemes triquetrous, ca. 0.3 mm wide, brownish, glabrous, hispidulous at the angles, with spikelets on the distal 1/4–1/2 of its length. Spikelets fusiform, 3–3.5 mm, 1-flowered, laterally compressed, tight against the rachis, subsessile, alternate and distant in 2 series along the rachis; pedicels ca.

0.5 mm, slightly flattened, with hispidulous angles. Glumes subequal, 3–3.5 mm, longer than the floret, membranous or slightly indurated, brownish, 1-nerved, the nerve greenish, scabrous along the nerve, awnless, glabrous; floret shortly stipitate, with a blunt callus nearly 0.1 mm, densely villous; lemma membranous 2.4–2.8 mm, 3-nerved, the nerves inconspicuous, pubescent over the middle nerve and the margins, occasionally pubescent on the whole surface, shortly bifid and lacinate at the apex, yellowish, with a subapical awn 1–2 mm, rarely longer, straight, hispidulous; palea membranous, pale, 2-nerved, equal to the lemma, shortly lacinate at the apex, glabrous, the apex hispidulous; rachilla prolonged behind the floret, terete, ca. 1 mm, hispidulous, its apex ending in a short, scabrous, awnlike rudiment. Caryopsis fusiform, 1.8–2 mm, brownish red; embryo less than 1/3 the length of the caryopsis, hilum basal, punctiform.

Distribution and habitat. *Gymnopogon brevifolius* is restricted to the southeastern United States, where it is found in sandy pine woodlands, between sea level and 250 m. It has been noted to flower between August and December.

Observations. *Gymnopogon brevifolius*, *G. legrandii*, and *G. glaber* share the presence of extensive stoloniform rhizomes. *Gymnopogon legrandii* differs from *G. brevifolius* and *G. glaber* by its inflorescences with developed or reduced spikelets from the base of the spiciform racemes. *Gymnopogon glaber* can be distinguished by its lemmas bearing subapical awns 5–7 mm; in *G. brevifolius* awns are shorter, only 1–2 mm, and usually so in *G. legrandii*, 3–3.5(–7) mm. Smith (1971) related *G. brevifolius* with *G. ambiguus*, the latter species being the most frequent one in the United States, but both species grow in sandy woodlands, sharing ecologically similar sites. *Gymnopogon ambiguus* has short, robust rhizomes, from which several vigorous ascendent culms develop, and inflorescences with spiciform racemes that are floriferous from the base, in contrast to the racemes of *G. brevifolius*, which have spikelets restricted to the upper half of the inflorescence axis. Intermediate forms between both species were observed by Blomquist (1948), who suggested possible hybridization between them. Nevertheless, distinguishing characters between these species are: *G. ambiguus*, with basal sheaths longer than the internodes, spikelets 4.5–5 mm long, and lemma awn 5–6 mm long, versus *G. brevifolius*, with basal sheaths shorter than the internodes, spikelets 3–3.5 mm long, and lemma awn 1–2 mm long.

Representative specimens examined. U.S.A. **Alabama:** Cleburne Co., *Kral 44183* (NY). **Arkansas:** Union Co., ca. 3.5 mi. E of New London & 6.5 mi. NW of U.S. 82 E of Strong, Sec 31, T17S, R11W, *Thomas 103070* (NY). **Delaware:** Sussex Co., Sep. 1845, *Ellendale s.n.* (NY). **Florida:** Dade Co., Pineland Prairie, Tamiami Trail, W of Miami, *Small et al. 9388* (NY); dry pine barrens, near Jacksonville, *Curtiss 3442* (BM). **Georgia:** Murray Co., ca. 0.7 mi. W of Chatsworth, S of Market Street, E of jct. Charles Rd., ca. 0.85 rd. mi. W of jct. U.S. Hwy. 411/76, 770 ft., *Allison & Ware 9547* (BM). **Louisiana:** Natchitoches, *Palmer 8876* (NY). **Maryland:** Assateague Island, 1.3 mi. S of bridge cause-way, Rte. 611, State Park, *Hill 15844* (NY). **Mississippi:** Biloxi, *Tracy 4538* (BM). **New Jersey:** Cape May, *Mackenzie 6700* (NY). **North Carolina:** Cumberland Co., 2.5 mi. WNW of Roslin, *Ahles 36570* (NY); Durham Co., Durham, 26 Oct. 1931, *Blomquist s.n.* (NY). **South Carolina:** Charleston Co., Santee Coastal Reserve, Washo Res., S side Santee Gun Club rd., 2.1 mi. E of S Santee rd., *Hill 24537* (NY). **Texas:** Sabine Co., Sabine Natl. Forest, U.S. 96, 13.2 mi. S of Bronson grain elevator, *Smith 2475* (BM). **Virginia:** Nansemond Co., W Railway 1–1.5 mi. W of Kilby, *Fernald 15175* (NY).

4. *Gymnopogon burchellii* (Munro ex Döll) Ekman, Ark. Bot. 11(4): 35. 1912. Basionym: *Leptochloa burchellii* Munro ex Döll, Fl. Bras. (Martius) 2(3): 93. 1878. *Rhabdochloa burchellii* (Munro ex Döll) Kuntze, Revis. Gen. Pl. 2: 788. 1891. TYPE: Brazil. “In prov. S. Paulo,” s.d., *W. J. Burchell 4462* (holotype, K, K photo at SI!; isotypes, BAA-1379!, BR not seen, BR fragm. at US not seen, K fragm. at US not seen). Figure 4.

Gymnopogon muticus Hack., Anales Mus. Nac. Buenos Aires 21 (ser. 3, 14): 117. 1911, nom. nud.

Plants perennial, shortly rhizomatous, rhizomes generally thick, knotty and short, yellowish and glabrous; culms 20–80 cm, 1–1.5 mm diam., terete, slender, erect to decumbent, simple or branched, erect or geniculate at the basal nodes; internodes slightly glaucous, glabrous; floriferous culms terete, hispidulous toward the apex. Sheaths shorter than the internodes, longitudinally striate, yellowish, glabrous or slightly pilose at the margins; collar inconspicuous; ligules 0.1–0.5 mm, membranous, the margin shortly ciliate; pseudoligule occasionally present, with macrohairs up to 2 mm; blades linear, 16–80 × 0.2–0.8 cm, distichous, divergent, flat, conspicuously acuminate, cordate at the base, glabrous on both surfaces, adaxial surface rarely scabrous, the margins scabrous. Inflorescence of 8 to 17 ascendent spiciform racemes, partially included in the upper sheath, 8–21 cm, alternate or grouped; main axis triquetrous, 8–30 cm, glabrous, with scabrous angles; rachis or the racemes triquetrous, 0.2–0.3 mm wide, greenish, glabrous, with scabrous angles. Spikelets fusiform, 1.9–5 mm, laterally compressed, tight against the rachis, sessile, alternate and distant in 2 series along the

rachis, (1 to)2(to 3)-flowered, occasionally with a rudiment of 1 or 2 apical florets with lemmas minutely awned; pedicels 0.3–0.8 mm, flattened, hispidulous. Glumes subequal, longer than the floret, lower glume 1.9–5 mm, upper glume 2.3–5 mm, membranous, yellowish, 1-nerved, slightly indurated and scabrous at the nerve, awnless, glabrous; lower floret shortly stipitate, callus nearly 0.1 mm, glabrous, rarely minutely pubescent; lemma membranous 1.6–2.6 mm, 3-nerved, the lateral nerves inconspicuous and near the margins, shortly bifid at the apex, awnless, violaceous, glabrous or pubescent at the apex; palea membranous, pale, 2-nerved, 1.5–2.1 mm, shortly ciliolate at the margins; upper florets similar to the lower one but smaller; rachilla prolonged behind the upper floret, terete, 0.9–1.5 mm, ending in a minute awnless rudiment. Caryopsis fusiform 1–1.8 × 0.2–0.3 mm; embryo less than 1/3 the length of the caryopsis, hilum basal, punctiform.

Distribution and habitat. *Gymnopogon burchellii* has been collected in natural grasslands of southern Brazil, Paraguay, Uruguay, and Argentina, between sea level and 1300 m. The taxon has been collected in flower between January and May.

Observations. *Gymnopogon burchellii* is easily recognized within *Gymnopogon* by its florets with lemmas and rachilla awnless and the callus generally glabrous. According to collection labels (*Meyer 2294*, *Schulz 1055*, *Schulz 11516*), this species has rhizomes with medicinal properties.

Caro (1982) mentioned the presence of a minute awn, to 0.5 mm, on the lemma of the upper reduced floret, and Boechat and Valls (1990b) cited specimens from Brazil with spikelets bearing up to four fertile florets and a reduced upper floret. However, these characters were not observed in the examined specimens.

Representative specimens examined. ARGENTINA. **Chaco:** Mayor Luis J. Fontana, Ea. Urien, *Schulz 3237* (CTES). **Corrientes:** Capital, “El Piso,” *Carnevali 475* (CTES). **Misiones:** Candelaria, Loreto, *Ekman 701* (CORD). BRAZIL. **Distrito Federal:** Gallery forest ca. 25 km SW of Brasília, *Irwin et al. 13073a* (NY). **Mato Grosso:** Vic. of Dourados, *Chase 10962* (BAA). **Minas Gerais:** Lavras, *Chase 8762* (NY). **Paraná:** S. José dos Pinhães, Rincão, *Hatschbach 3010* (BAA). **Santa Catarina:** Campo Alegre, Bog, lower fazenda of Ernesto Scheide, *Smith & Klein 10530* (NY). PARAGUAY. **Itapúa:** Isla Yacyretá, *Jiménez 14641* (BAA). **Paraguarí:** Caapucú, Est. Barrerito, *Rojas 13174* (BAA). URUGUAY. **Tacuarembó:** Camino a Ribera, a 32 km de Tacuarembó, *Cabrera & Zuloaga 32419* (SI).

5. *Gymnopogon chapmanianus* Hitchc., Amer. J. Bot. 2: 306. 1915. TYPE: United States. Florida: Seminole Co., Sandford, sandy meadow, 25 Sep.



Figure 4. *Gymnopogon burchellii*. —A. Habit. —B. Ligule. —C. Portion of the rachis with spikelets. —D. Floret, lateral view. —E. Floret, ventral view. —F. Caryopsis, hilum view. —G. Caryopsis, scutellar view. A–G drawn from A. Ragonese 6747 (BAB).

1907, A. Chase 4135 (holotype, US-733684!, US photo at SI!). Figure 5.

Gymnopogon floridanus Swallen, N. Amer. Fl. 17(8): 607. 1939. TYPE: United States. Florida: Clay Co., collected on open, sandy prairie, Penny Farms, 15 Nov. 1938, J. R. Swallen 5596 (holotype, US-1723536 not seen, US photo at SI!; isotype, L not seen).

Plants perennial, shortly rhizomatous, rhizomes ca. 1 cm, from which several shoots develop; culms (15–)

45–70 cm, 1.4–1.5 mm diam., robust, simple, sometimes loosely branched, ascendent or decumbent, erect; internodes yellowish, finely striate, glabrous; nodes inconspicuous, slightly thickened or narrowed, glabrous; floriferous culms terete, yellowish, inconspicuously striate, glabrous. Sheaths shorter than the internodes, striate, yellowish, the margins pale, smooth and glabrous; ligules ca. 0.5 mm, membranous-ciliate; pseudoligule absent; collar con-

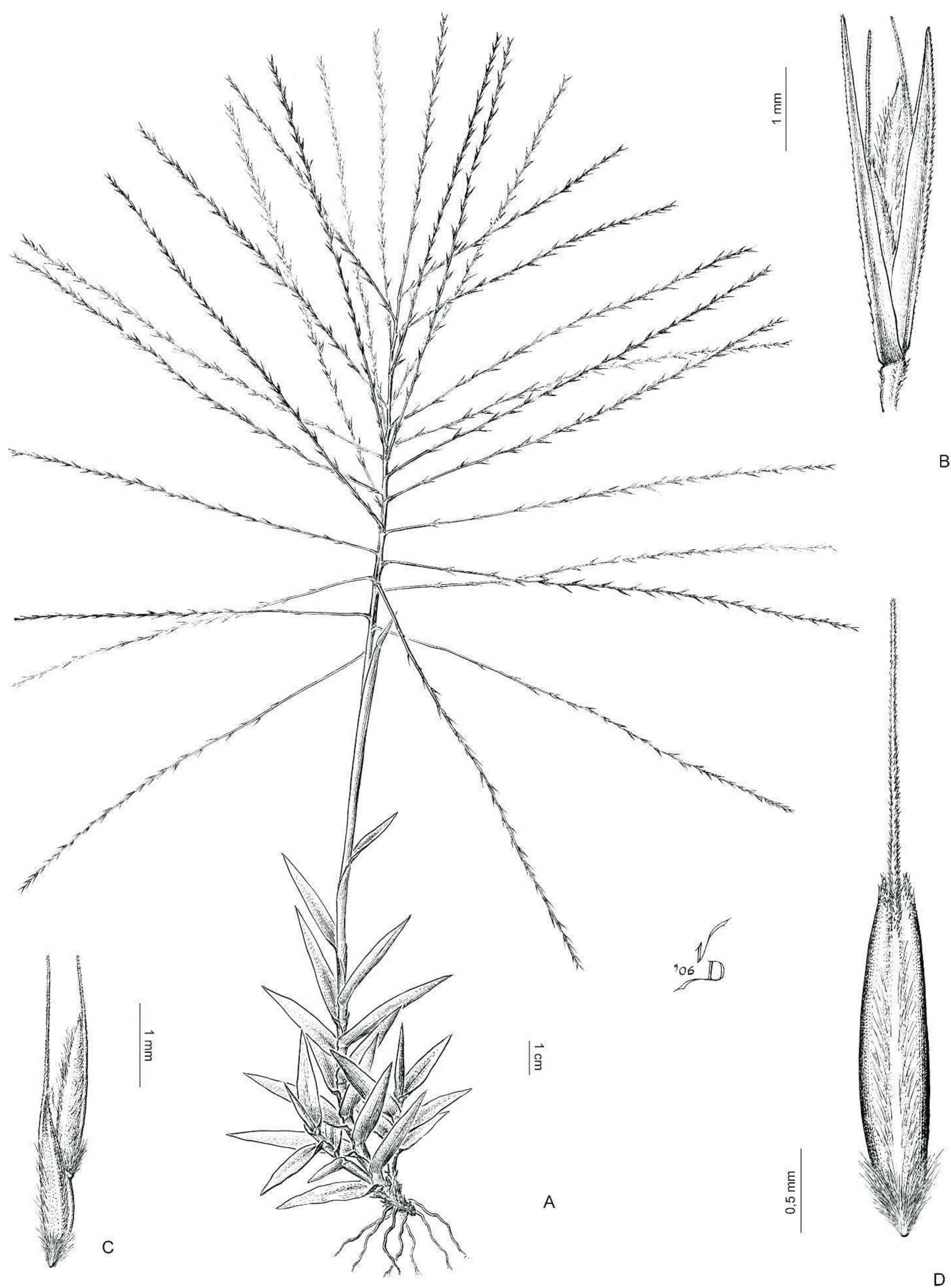


Figure 5. *Gymnopogon chapmanianus*. —A. Habit. —B. Spikelet. —C. Spikelet detached from glumes. —D. Floret. A drawn from *Small & Carter 1030* (NY); B–D drawn from *Curtiss 3441 p.p.* (NY).

spicuous, whitish to reddish, strongly narrowed, glabrous; blades linear-lanceolate, $(2.5\text{--})7\text{--}8.5 \times 0.2\text{--}0.5\text{--}(0.6)$ cm, conspicuously cordate, acute or shortly acuminate, distichous on the basal $2/3$ of the culms, ascendent, flat, longitudinally striate and glabrous on both surfaces, occasionally scabrous on the abaxial surface, the margins shortly scabrous. Inflorescence of (5 to)15 to 25(to 40) spiciform racemes, $(5\text{--})11\text{--}20$ cm, ascendent or divergent,

densely alternate, rarely in pairs; main axis triquetrous, 9–13 cm, brownish, glabrous, the angles scabrous; rachis of the racemes triquetrous, 0.2–0.3 mm wide, brownish, villous at the base, otherwise glabrous, the angles scabrous, floriferous from the base, with reduced basal spikelets. Spikelets fusiform, laterally compressed, $(2.5\text{--})4.5\text{--}5\text{--}(6)$ mm, 2(to 3)-flowered, subsessile, alternate and distant in 2 series along the rachis; pedicels ca. 0.5 mm, slightly

flattened, scabrous. Glumes subequal, slightly open, lower glume (2.5–)4.5–5(–6) mm, upper glume 3–4(–5) mm, longer than the florets, membranous, violaceous, acuminate, glabrous, with scabrous margins 1-nerved, the nerve yellow greenish and scabrous, slightly indurated, awnless; lower floret shortly stipitate, callus blunt, ca. 0.1 mm, densely villous; lemma membranous, ca. 2 mm, 3-nerved, the nerves inconspicuous, shortly bifid at the apex, violaceous, loosely villous all over the surface, mainly on the middle nerve, with a straight subapical awn, (1–)1.5(–2) mm, scabrous, occasionally awnless; palea membranous, subequal to the lemma, pale, 2-nerved, shortly lacinate at the apex, glabrous; upper florets similar to the lower one, but smaller; rachilla prolonged behind the floret, terete, ca. 1.5 mm, scabrous, its apex bearing an awnlike rudiment 0.8–3 mm, scabrous. Caryopsis not seen.

Distribution and habitat. *Gymnopogon chapmanianus* is restricted to the state of Florida in the southeastern United States. It has been rarely collected and occurs in arid zones. Flowering was recorded between October and November.

Observations. Hitchcock (1915: 307) mentioned that spikelets of *Gymnopogon chapmanianus* can have up to four flowers; however, in the examined specimens, spikelets had up to only three flowers. Hitchcock also mentioned that the dense distribution of the spiciform racemes gives the inflorescence a fanlike aspect. Hitchcock (1951) recognized both *G. chapmanianus* and *G. floridanus* as separate species, and mentioned characters to identify them, such as the position and number of spiciform racemes, and spikelet features, e.g., the glumes wide open in *G. chapmanianus*, leaving the florets visible. Smith (1971), after an exhaustive analysis of herbarium material and field observations, also accepted both species, but suggested a possible hybridization between them due to the presence of intermediate specimens with different combinations of characters cited before, making it difficult to classify them. The variation of reproductive characters between both species makes it reasonable to continue to consider them as one unique entity, and therefore *G. floridanus* is considered as a synonym of *G. chapmanianus*.

Representative specimens examined. U.S.A. **Florida:** Braidentown, *Tracy 7102* (BM, NY); Brevard Co., *Fredholm 6207* (SI); dry pine barrens near Jacksonville, *Curtiss 6262* (NY).

6. *Gymnopogon delicatulus* (C. B. Clarke ex Hook. f.) Bor, *Grasses Burma, Ceylon, India & Pakistan 472*. 1960. Basionym: *Chloris delicatula* C. B. Clarke ex Hook. f., *Fl. Brit. India* [J.

D. Hooker] 7(22): 290. 1896 [1897]. TYPE: India. Madhya Pradesh: Mandu, Hazarabagh, Chota Nagpore, 18 Oct. 1883, *C. B. Clarke 33855* (lectotype, designated here, K not seen, K photo at SI!). Figure 6.

Plants annual, slender, with 1 to 4 ascendent culms, 13–30 cm, 0.5–1 mm diam., terete, simple or slightly branched; internodes yellowish to brownish, inconspicuously striate, glabrous; nodes slightly narrowed, brown reddish, glabrous; floriferous culms terete, glabrous, inconspicuously striate. Sheaths equal or shorter than the internodes, finely striate, yellowish, glabrous, villous in the margins near the collar; ligules 0.1–0.3 mm, membranous, the margin densely ciliate; pseudoligule a ring of macrohairs up to 2 mm; collar whitish, strongly narrowed, glabrous, with hairs toward the margins; blades linear-lanceolate, 1–3.5 × 0.1–0.3 cm, distichous, divergent on the lower 2/3 of the culms, convolute, subcordate, the apex acuminate, longitudinally striate, glabrous on both surfaces, with scabrous margins. Inflorescence of (6 to)7 to 9(to 12) spiciform racemes, 3–6 cm, ascendent, alternate; main axis triquetrous, 1–2 cm, glabrous, with scabrous angles; rachis of the racemes triquetrous 0.1–0.2 mm wide, straight, violaceous, glabrous, scabrous at the angles, floriferous from the base. Spikelets fusiform, laterally compressed, 1.8–2.2 mm, 1-flowered, tight against the rachis, subsessile, alternate and distant in 2 series along the rachis; pedicels ca. 0.1 mm, flattened, glabrous. Glumes subequal, lower glume 1.8–2 mm, upper glume 2–2.2 mm, longer than the floret, membranous, violaceous, 1-nerved, the nerve scabrous, otherwise glabrous, awnless; floret shortly stipitate, callus ca. 0.2 mm, villous; lemma membranous, ca. 1.4 mm, 3-nerved, the nerves inconspicuous, shortly bifid at the apex, yellowish, with whitish macrohairs 0.1–0.3 mm at the margins and scattered on the base, mainly at the middle nerve, with a straight or slightly flexuous subapical awn, 6–7 mm, violaceous, shortly hispid; palea membranous, pale, 2-nerved, 5–6 mm, shortly lacinate at the apex, slightly pubescent all over the surface; rachilla prolonged behind the floret, terete, ca. 1 mm, scabrous, its apex ending in 2(to 3) awnlike rudiments, 4–7 mm, unequal in length, scabrous. Caryopsis fusiform, 0.7–1 mm; embryo less than 1/3 the length of the caryopsis, hilum basal, punctiform.

Distribution. *Gymnopogon delicatulus* is the single Old World species of the genus, with an annual habit, where it is found in southern Asia, in Burma (Myanmar), India, and Thailand, between 200 and 400 m in elevation. Specimens of this species from Cambodia have been studied by Smith (1971: 359).

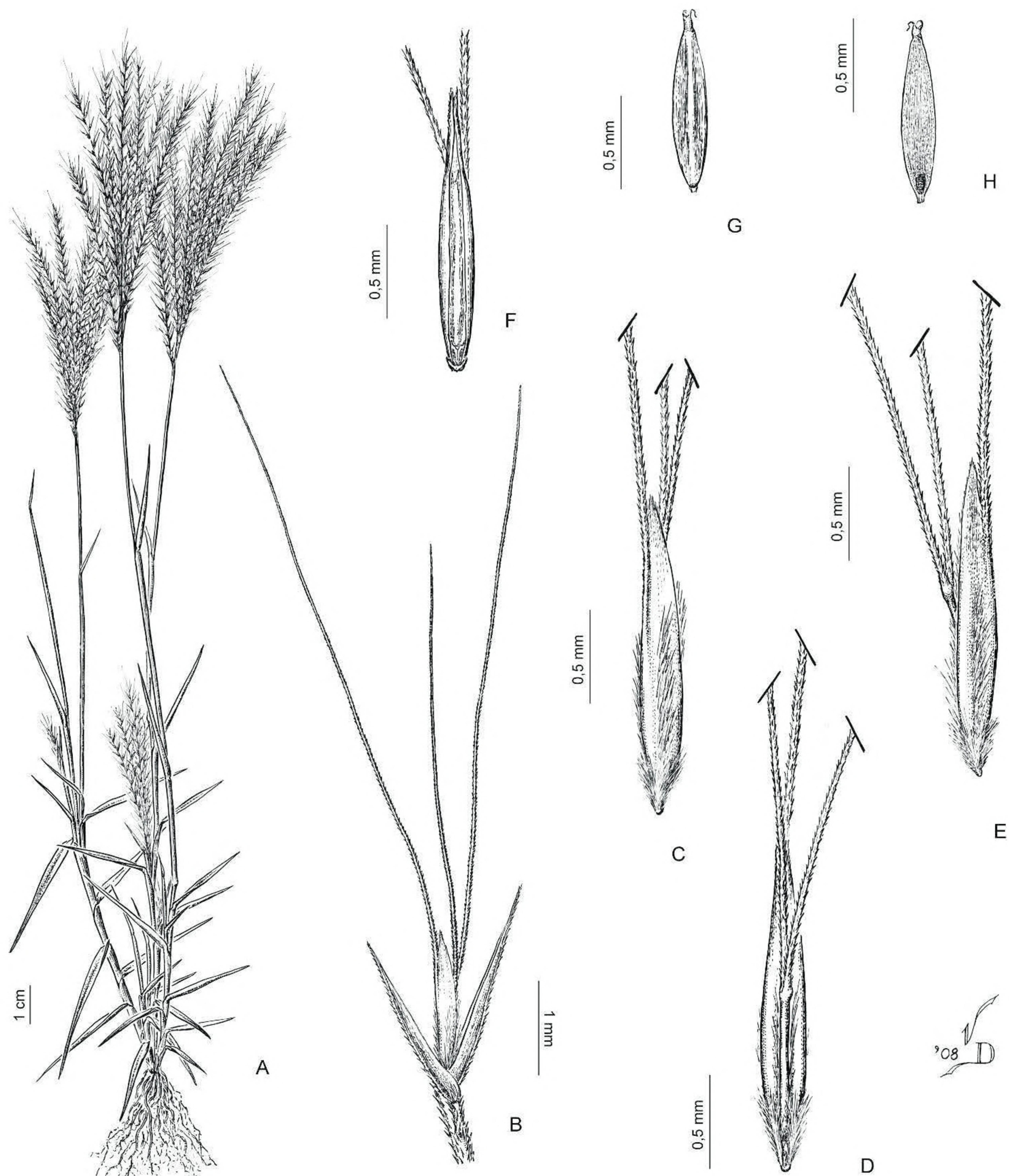


Figure 6. *Gymnopogon delicatulus*. —A. Habit. —B. Spikelet. —C–E. Spikelet detached from glumes, three different views. —F. Palea with lodicules and flower. —G. Caryopsis, scutellar view. —H. Caryopsis, hilum view. A–H drawn from *Charoenphol et al.* 4934 (NY).

The taxon is noted as flowering between July and November.

Observations. Hooker (1897: 290) mentioned two specimens in the protologue of *Chloris delicatula*: the lectotype (*Clarke 33855*) was collected in India and the specimen *Kurz 1175* is from Pegu-Yoma in Burma (Myanmar). Hooker (1897: 290) mentioned two specimens in the protologue of *Chloris delicatula*, both without collection numbers: the lectotype was collected in India and the second by Kurz, from Pegu-Yoma in Burma (Myanmar). Both syntypes were located at the herbarium of the Royal Botanic Gardens, Kew (K), and a photograph of each was

analyzed. Both specimens include drawings with details of spikelet structure. The specimen collected in India is here designated as the lectotype, as it is the one that better matches the protologue.

Gymnopogon delicatulus and *G. foliosus* (Willd.) Nees share the presence of two or three awnlike rudiments at the end of the rachilla. *Gymnopogon foliosus* differs by its robust habit, longer florets 1.6–2.3 mm, with glabrous lemmas, and awns (7–) 8.5–23 mm.

Representative specimens examined. MYANMAR. **Ba-go:** Pegu Yomah, Herb., *Kurz 1175* (K, syntype). THAILAND. **Chiang Mai:** Doi Suthep, *Kerr 156103* (BM). **Loei:**



Figure 7. *Gymnopogon doellii*. —A'. Habit, basal portion. —A. Habit, apical portion. B. Portion of the rachis with spikelets. —C. Spikelet. —D. Spikelet detached from glumes, lateral view. —E. Spikelet detached from glumes, ventral view. A–E drawn from *Bianchetti & Batista 1516* (CEN); A' drawn from *Martins s.n.* (CEN-64736).

Na noi, foothill of Phu Kradung, *Charoenphol et al.* 4934 (NY).

7. ***Gymnopogon doellii*** Boechat & Valls, *Bradea* 5(28): 314. 1990. TYPE: Brazil. Distrito Federal: Area de Proteção ambiental da Bacia do Rio São Bartolomeu, ca. 5 km S do local onde será construída a barragem do futuro lago, em leito seco de um córrego temporário, 6 June 1989, *T. S. Filgueiras & S. P. Araújo* 1803 (holotype, CEN not seen; isotypes, CEN-12341 not seen, CEN photo at SI!, IBGE not seen). Figure 7.

Gymnopogon rigidus Döll, *Fl. Bras. (Martius)* 2(3): 80. 1878, nom. illeg., non *Gymnopogon rigidus* Thwaites, *Enum. Pl. Zeyl. [Thwaites]*: 372. 1864. TYPE: Brazil. Minas Gerais: "Habitat ad Lagoa Santa Prov. Minarum," *J. E. B. Warming s.n.* (holotype, B not seen).

Plants perennial, rhizomatous, rhizomes ca. 1 cm, short and thick; culms 50–100 cm, 2.5–6 mm diam., robust, rigid, simple, ascendent; internodes yellowish, somewhat brownish near the nodes, finely striate, glabrous; nodes slightly thickened, brownish, glabrous; floriferous culms terete or angular, glabrous. Sheaths longer than the internodes, striate, brownish, glabrous, the margins smooth, densely villous toward the collar; ligules ca. 0.2 mm, membranous, the margin irregular and shortly ciliate; pseudoligule absent; collar conspicuous, brownish, strongly narrowed, villous toward the margin, otherwise glabrous; blades broadly lanceolate, 5–9 × 0.7–1.7 cm, distichous, ascendent or divergent, flat, subcordate, acute or acuminate, longitudinally striate on both surfaces, adaxial surface glabrous, abaxial surface puberulous, the margins scabrous. Inflorescence of 15 to 30 spiciform racemes, 9–21 cm, robust, exserted or partially included in the upper sheath, divergent, alternate; main axis triquetrous, 13–14 cm, glabrous; rachis of the racemes 0.2–0.3 mm wide, straight, brownish, densely villous at the base, otherwise glabrous, with scabrous angles, floriferous from the base, with basal spikelets developed. Spikelets fusiform, laterally compressed, 5.1–9.6 mm, 1-flowered, tight against the rachis, alternate in 2 series along the rachis, imbricate at the apex, shortly pedicellate; pedicels 1.5–2 mm, flattened, puberulent. Glumes subequal, lower glume 5.1–9 mm, upper glume 5.2–9.6 mm, conspicuously longer than the floret, membranous, yellowish, 1-nerved, slightly indurated, awnless, scabrous along the nerve, glabrous on the rest of the surface; floret shortly stipitate, callus near 0.3 mm, blunt, subglabrous; lemma membranous, 2.4–3.1 mm, 3-nerved, the

nerves conspicuous, minutely bifid at the apex, yellowish, with few macrohairs near the margins at the apex and all over the surface, with a subapical awn 7–12 mm, straight, scabrous; palea membranous, pale, 2-nerved, 2–2.9 mm, scabrous on the nerves and near the apex, otherwise glabrous; rachilla prolonged behind the floret, terete, 1–1.5 mm, scabrous, the apex ending in a reduced floret, with lemma 0.5–1.2 mm, villous toward the margins and apex, with an awn 2.2–7 mm. Caryopsis fusiform, ca. 2.3 mm, brownish; embryo less than 1/3 the length of the caryopsis, hilum basal, punctiform.

Distribution and habitat. *Gymnopogon doellii* has been rarely found in Brazil, collected from the states of Minas Gerais, Goiás (according to Boechat & Valls, 1990a: 314, 1990b: 12), and Distrito Federal, and is noted as flowering between February and June.

Observations. *Gymnopogon doellii* has spikelets with conspicuous, acuminate glumes that are twice the length of the fertile floret. The presence of this long acumen makes the spikelets imbricate at the apex of the spiciform racemes. *Gymnopogon doellii* is similar to *G. spicatus* in habit and size, the latter species differing by having a pseudoligular ring of hairs, and by its inflorescences with glumes shortly aristulate. *Gymnopogon doellii* is also related to *G. ambiguus*, the latter with shorter glumes 4–5.5 mm, not conspicuously acuminate, and lemmas 3–4 mm, often longer than the 2.4–3.1 mm lemmas seen in *G. doellii*.

Representative specimens examined. BRAZIL. **Distrito Federal:** Brasília, Faz. Sucupira, campo sujo à esquerda da mata do Riacho Fundo, *Bianchetti & Batista* 1516 (CEN); Parque Nac. de Brasília, transição entre a cascalheira do entroncamento e o cerrado, May 2007, *Martins s.n.* (CEN 64736).

8. ***Gymnopogon fastigiatus*** Nees, *Fl. Bras. Enum. Pl.* 2: 430. 1829. *Monochaete fastigiata* (Nees) Döll, *Fl. Bras. (Martius)* 2(3): 79. 1878. *Doellichloa fastigiata* (Nees) Kuntze, *Revis. Gen. Pl.* 2: 773. 1891. TYPE: Brazil. São Paulo: "[h]abitat in campis altis, Generales dictis, provinciae S. Pauli," *Martius s.n.* (holotype, B 100367066 image!; isotype, LE-TRIN-2119.01 fragm. ex B!). Figure 8.

Plants perennial, slightly caespitose, rhizomatous, rhizomes 1–1.2 cm, short and thick, from which several culms generally develop; culms (35–)40–90(–120) cm, ca. 0.5 mm diam., ascendent, simple, occasionally branched and geniculate at the basal nodes; internodes yellowish or brownish, inconspicuously striate, glabrous; nodes inconspicuous, yel-

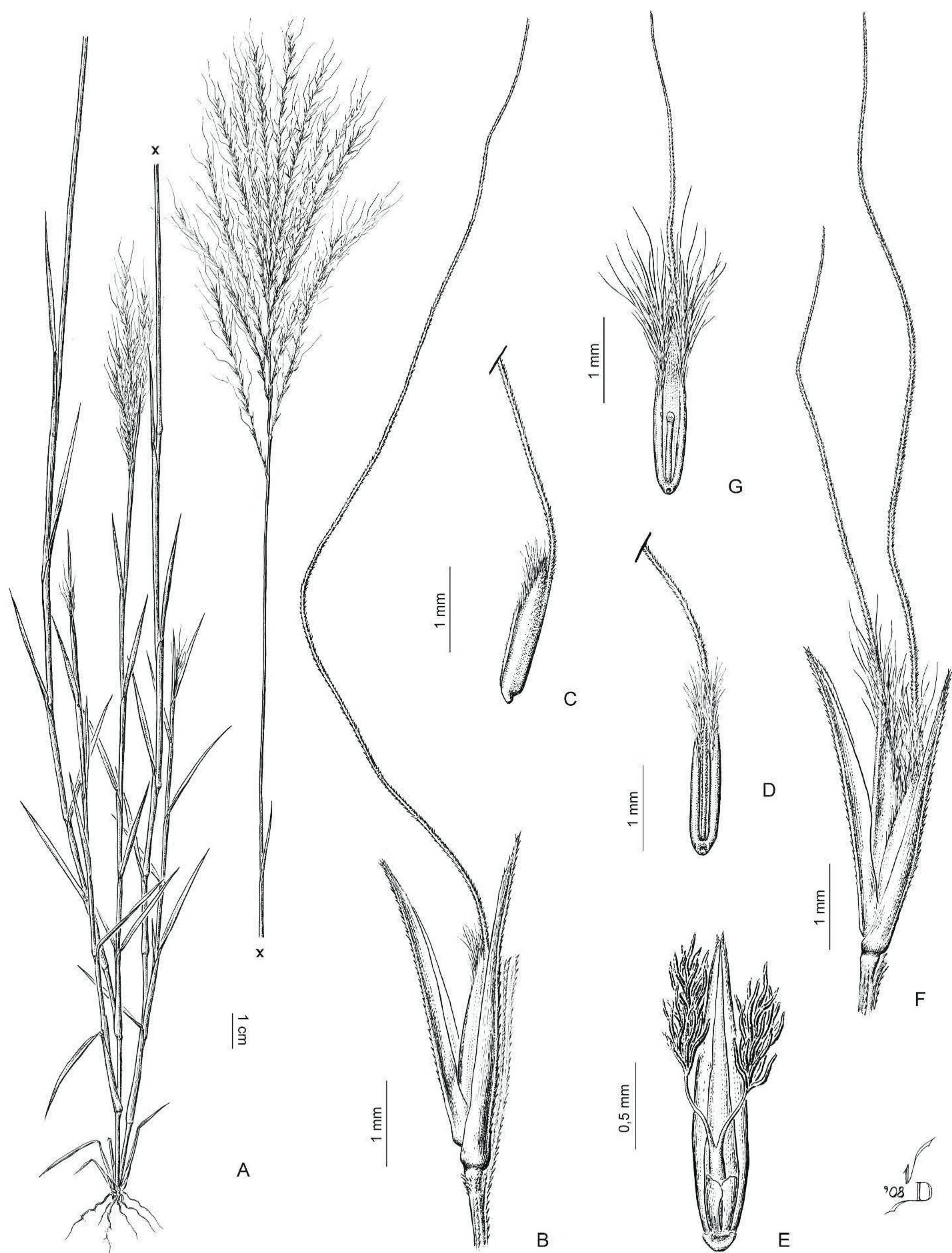


Figure 8. A–E. *Gymnopogon fastigiatus* subsp. *fastigiatus*. —A. Habit. —B. Spikelet. —C. Floret, lateral view. —D. Floret, ventral view. —E. Palea, lodicules, and stigmas. F, G. *Gymnopogon fastigiatus* subsp. *jubiflorus*. —F. Spikelet. —G. Floret. A–E drawn from *Irwin 16429* (NY); F, G drawn from *Killeen 2588* (NY).

lowish, glabrous; floriferous culms terete, yellowish, inconspicuously striate, glabrous or scabrous. Sheaths shorter or longer than the internodes, striate, yellowish, glabrous, the margins smooth; ligules 0.1–0.3 mm, membranous, the margins densely ciliate; pseudoligule, when present, a group of long macrohairs near the margins of the ligule; collar conspicuous, reddish, strongly narrowed, glabrous; blades

linear-lanceolate, (1.5–)2.5–4.5(–10.5) × 0.1–0.3(–0.4) mm, distichous, ascendent or divergent, convolute, slightly subcordate at the base, acuminate, longitudinally striate on both surfaces, adaxial surface hispidulous, abaxial surface glabrous, the margins scabrous. Inflorescence of (3 to)4 to 20 spiciform racemes (2–)6–9 cm, ascendent, alternate; main axis triquetrous 4.5–6.5 cm, longitudinally

sulcate, brownish, scabrous at the angles, otherwise glabrous; rachis of the racemes nearly 0.2 mm wide, sinuous, greenish, hispidulous over the entire surface, mainly at the angles, floriferous from the base, with spikelets developed basally. Spikelets fusiform, laterally compressed, 3.5–4.5 mm, 1- to 2-flowered, tight against the rachis, subsessile, alternate and distant in 2 series along the rachis; pedicels 0.3–0.5 mm, terete, hispidulous. Glumes subequal, lower glume 3.5–4 mm, upper glume 3–4.5 mm, longer than the florets, membranous, violaceous, 1-nerved, the nerve conspicuous, greenish and scabrous, slightly indurated, outwardly curved to straight, glabrous, awnless; lower floret shortly stipitate, callus 0.1–0.2 mm, blunt, glabrous; lemma membranous, 1.8–2 mm, 3-nerved, the nerves inconspicuous, minutely bifid and lacinate at the apex, yellowish, glabrous all over the surface, with dense whitish macrohairs (0.3–)1.5–2 mm on the distal third of the margins, with a subapical awn 8–14 mm, slightly bigeniculate and twisted along its length except on the base, violaceous, scabrous; palea membranous, pale, 2-nerved, equal to the lemma, shortly lacinate at the apex, glabrous; rachilla prolonged behind the floret, terete, ca. 1.4–1.5 mm, glabrous to hispidulous, the apex ending in an awnlike rudiment up to 0.5 mm, scabrous. Caryopsis fusiform, ca. 1.5 mm (immature), brownish.

Observations. Hitchcock (1927) mentioned the similarity between *Gymnopogon fastigiatus* and *G. jubiflorus*, and gave a list of characters to identify them, mainly related to spikelet characters. Smith (1971), after studying material of both species, including the type material of *G. jubiflorus*, considered that this species should be recognized as a subspecies, as *G. fastigiatus* subsp. *jubiflorus* (Hitchc.) J. P. Smith. He used only reproductive characters to distinguish them: subspecies *fastigiatus* has, according to Smith (1971: 361), spikelets 1-flowered, lemmas shortly pubescent, and glumes not outwardly curved, while subspecies *jubiflorus* has spikelets 2-flowered, lemmas with longer hairs, and glumes curved. Boechat and Valls (1990b) also considered *G. jubiflorus* as a synonym of *G. fastigiatus*.

Within the specimens examined here, the presence of 2-flowered spikelets and long hairs in the lemma (Beck 2039, Killeen 2588, Killeen 2077, all from Bolivia) correspond with *Gymnopogon fastigiatus* subsp. *jubiflorus*, while the 1-flowered spikelets and shorter hairs on the lemma correspond with the autonymic subspecies in the remaining specimens from Brazil, Colombia, and Venezuela, as well as

collections from Bolivia. Smith's concept (1971) is followed in the present contribution; nevertheless, the shape of the glumes is variable, ranging from outwardly curved to straight, and is not considered of sufficient taxonomic value to distinguish both taxa at the species level.

KEY TO THE SUBSPECIES OF *GYMNOPOGON FASTIGIATUS*

- 1a. One floret; lemma with hairs 0.3–1 mm.....
..... 8a. *G. fastigiatus* subsp. *fastigiatus*
- 1b. Two florets; lemma with hairs 1.5–2 mm.....
..... 8b. *G. fastigiatus* subsp. *jubiflorus*

8a. *Gymnopogon fastigiatus* subsp. *fastigiatus*.

Distribution and habitat. *Gymnopogon fastigiatus* subsp. *fastigiatus* has been collected from Colombia, Venezuela, Brazil, and Bolivia. It is present in open, humid fields between sea level and 600 m, flowering between December and July.

Representative specimens examined. BOLIVIA. **Santa Cruz:** Nuflo de Chavez, Est. San Josecito, 8 km NW of Concepción, 16°05'S 62°05'W, Killeen 1029 (NY). BRAZIL. **Santa Catarina:** Barra do Garças-Xavantina rd., 25 km from Xavantina, Hunt 5905 (NY). COLOMBIA. **Vichada:** ca. 8 km E of Las Gaviotas along dirt rd. to Santa Rita, Davidse & Llanos 5179a (NY). VENEZUELA. **Amazonas:** Atures, pequeña sabana ubicada entre los cerros al N de Laguna Maguari, vertientes SE del valle del Alto Río Parucito, 5°43'N 65°48'W, Huber 4576 (NY); Río Puciarí tributary of Río Ituxi, 20 km above mouth, Prance et al. 13816 (NY). **Bolívar:** W base of Cerro Marimarota, ca. 5 km upstream from mouth, Wurdack & Monachino 41113 (NY).

8b. *Gymnopogon fastigiatus* subsp. *jubiflorus* (Hitchc.) J. P. Smith, Iowa State J. Sci. 45: 361. 1971. Basionym: *Gymnopogon jubiflorus* Hitchc., Contr. U.S. Natl. Herb. 24(8): 412. 1927. TYPE: Bolivia. La Paz: Guanay, N Bolivia, 600 m, May 1886, H. H. Rusby 215 (holotype, US-879400!, US photo at SI!).

Distribution and habitat. *Gymnopogon fastigiatus* subsp. *jubiflorus* has been collected in northern and eastern Bolivia, between 200 and 500 m elevation. Flowering was noted between May and July.

Representative specimens examined. BOLIVIA. **Beni:** Yacuma, Est. Porvenir, Est. Biológica del Beni, 14°35'S 66°30'W, Killeen 2588 (NY). **Santa Cruz:** Nuflo de Chavez, Est. John Sandiforth, 5 km S of Concepción, 16°10'S 62°0'W, Killeen 2077 (NY).

9. *Gymnopogon foliosus* (Willd.) Nees, Fl. Bras. Enum. Pl. 2: 426. 1829. Basionym: *Chloris foliosa* Willd., Sp. Pl. ed. 4 [Willdenow] 4: 924. 1806. *Biatherium foliosum* (Willd.) Desv., Mém.

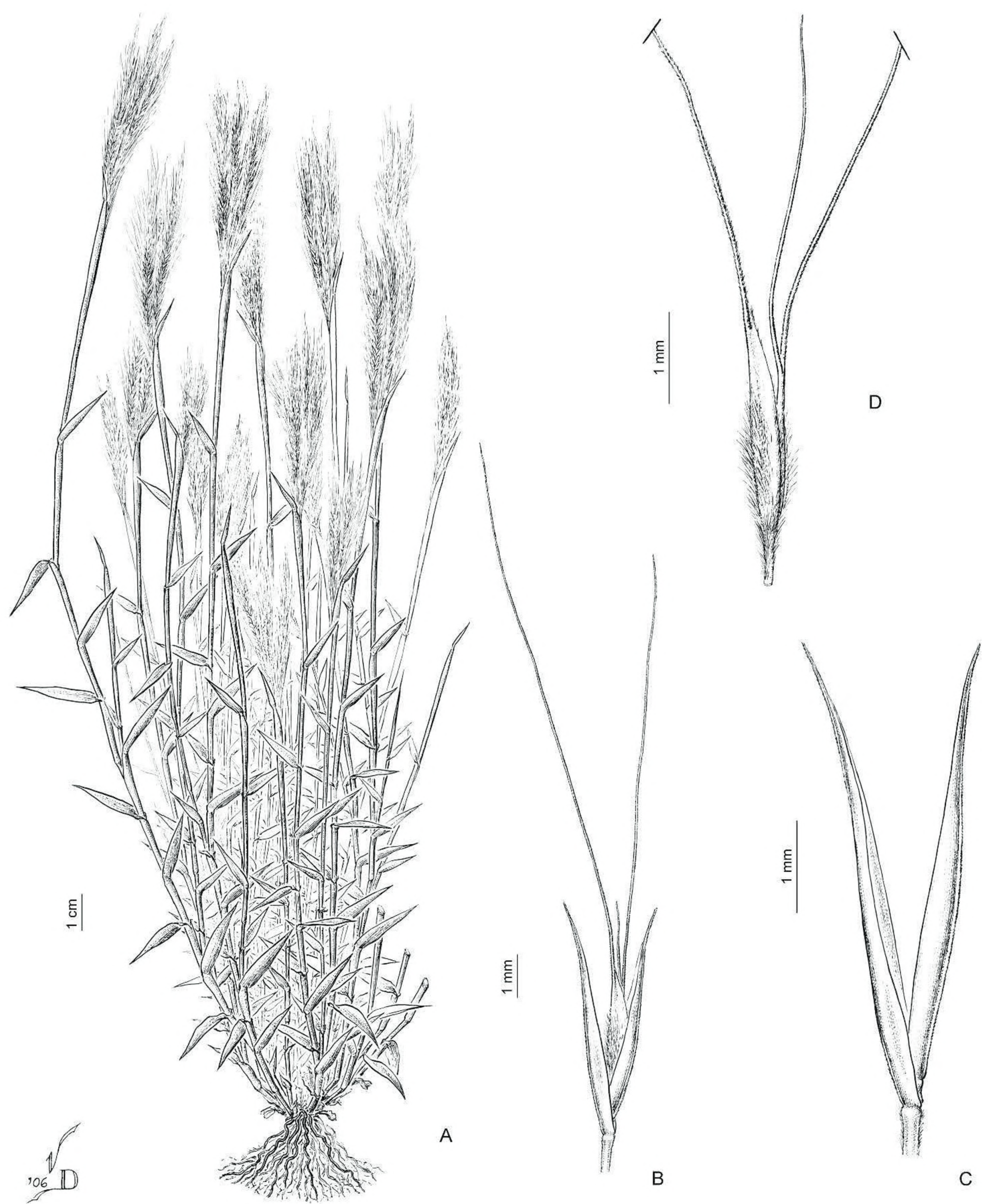


Figure 9. *Gymnopogon foliosus*. —A. Habit. —B. Spikelet. —C. Glumes. —D. Floret. A drawn from *Davidse 12145* (NY); B–D drawn from *Davidse 2810* (BM).

Soc. Agric. Angers 1: 176. 1831. TYPE: Virgin Islands: “Habitat in insula St. Thomas Americæ (v.s.),” *E. P. Ventenat s.n.* (holotype, B, B photo at SI!; isotypes, BM!, US fragm. ex B not seen). Figure 9.

Aristida geminata Willd. ex Steud., Nomencl. Bot. [Steudel], ed. 2, 1: 131. 1840, nom. inval., pro syn. *Gymnopogon foliosus* (Willd.) Nees.

Chloris aristida Salzm. ex Steud., Syn. Pl. Glumac. 1: 218. 1854, nom. inval., pro syn. *Gymnopogon foliosus* (Willd.) Nees.

Aristida chloris Salzm. ex Döll, Fl. Bras. (Martius) 2(3): 83. 1878, nom. nud.

Gymnopogon pullulans Döll, Fl. Bras. (Martius) 2(3): 82. 1878. TYPE: Brazil. S. loc., s.d., *W. J. Burchell 5398* (lectotype, designated by Smith [1971: 366], K not seen, K photo at SI!; duplicates, B image!, GH!, P not seen).

Plants annual, slightly caespitose; culms 15–50(–75) cm, 0.5–0.6 mm diam., ascendent, simple and erect or branched and geniculate at the basal nodes; internodes yellowish, finely striate, slightly thickened toward the nodes, glabrous; nodes inconspicuous, brownish, glabrous; floriferous culms terete, yellowish, longitudinally striate, glabrous. Basal sheaths longer than the internodes, the upper ones shorter, finely striate, yellowish, glabrous, the

margins shortly hispid to densely villous near the collar; ligules 0.1–0.5 mm, membranous, the margin densely ciliate; pseudoligule a few macrohairs near 1 mm; collar conspicuous, darker than the sheath, strongly narrowed, with few macrohairs; blades lanceolate, 8–15(–37) $\times$ 0.1–0.3 cm, distichous, divergent, convolute, occasionally flat, subcordate at the base, acute, longitudinally striate and glabrous on both surfaces, the margins hispidulous. Inflorescence of (2 to)4 or 5(to 10) spiciform racemes 2.5–4(–5.5) cm, partially included in the upper sheath, ascendent or divergent, digitate or subdigitate; main axis 1–2 cm, longitudinally sulcate, yellowish, scabrous at the angles, otherwise glabrous; rachis of the racemes nearly 0.2 mm wide, straight, yellowish, the angles greenish, hispidulous over the entire surface, floriferous from the base. Spikelets fusiform, laterally compressed, (3–)4.5–5.5(–7) mm, 1(to 2)-flowered, tight against the rachis, subsessile, densely alternate in 2 series along the rachis; pedicels ca. 0.5 mm, flattened, hispid. Glumes subequal, lower glume (2.5–)4.5–6 mm, upper glume (2.5–)4.5–5.5(–7) mm, longer than the florets, membranous, yellowish to violaceous, 1-nerved, the nerve conspicuous, yellowish and scabrous, slightly indurated, glabrous, awnless; floret shortly stipitate, callus near 0.8 mm, thin, hispid; lemma membranous, 1.6–2.3 mm, 3-nerved, the lateral nerves inconspicuous, shortly bifid at the apex, violaceous, glabrous, with a subapical awn (7–)8.5–23 mm, straight or slightly geniculate, yellowish or violaceous, hispidulous; palea membranous, pale, 2-nerved, equal to the lemma, glabrous; rachilla prolonged behind the floret, terete, near 1 mm, glabrous, the apex ending in 2 awnlike rudiments 3.8–15 mm, unequal in length, straight to slightly geniculate, shortly hispidulous. Caryopsis fusiform, near 1.2 mm, brownish red, glabrous; embryo less than 1/3 the length of the caryopsis, hilum basal, punctiform.

Distribution and habitat. *Gymnopogon foliosus* is distributed from the Caribbean (Puerto Rico, Virgin Islands, St. Thomas) through northern South America (Venezuela, Guyana, French Guiana, Suriname, and Brazil). It grows in sandy or stony soils up to 1200 m and is a typical species of cerrados and savannas.

Observations. Moscoso (1943) and Urban (1920) cited this species in Hispaniola, while Boechat and Valls (1990b) cited it in Colombia.

Representative specimens examined. BRAZIL. **Amapá:** Rio Araguari, 2 km from river, along rd. from Porto Platon to Macapa, *Pires et al.* 51064 (NY). **Amazonas:** Estr. Terra Preta, Km 2, branch of Manaus Manacapuri 5 km from Cacao Pirêra, *Prance* 23530 (NY). **Bahia:** Rio Roda Velha, ca. 150 km SW of Barreiras, *Irwin et al.* 14933 (NY).

Distrito Federal: Brasília, s.d., *Riedel s.n.* (SI 26007); Brasília, *Irwin et al.* 15315 (NY). **Goiás:** 10 km SW of Alvorada do Norte along hwy. BR-020, *Davidse et al.* 12200 (NY). **Maranhão:** Loreto, ca. 25 km S of city of Loreto, 7°17'S 45°7–8'W, *Eiten & Eiten* 4159 (NY). **Mato Grosso:** Serra do Roncador, Río Turvo, ca. 210 km N of Xavantina, *Irwin et al.* 16072 (NY). **Minas Gerais:** Diamantina, Fondo do Matador, *Mexía* 5853a (BM); Serra do Cabral, Joaquim Felício, *Hatschbach* 64845 (CTES). **Pará:** Itaituba, estr. Santarém-Cuiabá, BR 163, Km 794, Serra do Cachimbo, *Amaral et al.* 991 (NY). **Paraíba:** Cerrados, près de João Pessoa, *Schnell* 9489 (SI). **Pernambuco:** Cururú, *Rosa & Santos* 1870 (NY). **Rondônia:** BR-364, entre Pimenta Bueno e Vilhena, *Seitz s.n.* [ICN 23745] (CTES). **Roraima:** 10 km NNW of Boa Vista on BR 174, mtn. ca. 1 km E of rd., *Coradin & Cordeiro* 759 (NY). **São Paulo:** Itirapina, Rod. São Paulo-São Carlos, 10 km E da cidade de Itirapina, 22°16'00"S, 47°44'30"W, *Mimura* 354 D (NY). COLOMBIA. S. loc., *Linden* 1564 (BM). FRENCH GUIANA. Iracoubo, *Hook* 1151 (NY). GUYANA. Wismar, *Hitchcock* 17273 (BM, NY); Meribisci Lake, *Jenman* 2246 (BM); Rupunini, *Jenman* 5993 (BM, NY). PUERTO RICO. Near Laguna Tortuguero, *Britton & Britton* 7955 (NY). SURINAME. Sipaliwini savanna 5 km W of Morro Grande, *Oldenburger et al.* 431 (NY). VENEZUELA. **Amazonas:** Atures, alrededores de Puerto Ayacucho, 30 km N Sabanas de Rincones de Chacorro, a 5 km al NE de Galipero, 5°48' N 67°20'W, *Huber* 4770 (NY). **Anzoátegui:** 18 km W of El Tigra rd. to Pariaguán, on Mesa Guanipa, *Davidse et al.* 4973 (MO, NY). **Bolívar:** Piar, Uríman, 5°21'N 62°37'W, *Davidse & Huber* 23119 (MO, NY). **Zulia:** vic. of Mene Grande, *Pittier* 10599 (NY).

10. *Gymnopogon glaber* Caro, Dominguezia 5: 17. 1982. TYPE: Argentina. Salta: Dpto. Anta, Cerro Maldonado, June 1934, *A. Ragones* 131 (holotype, BA!; isotype, BAA!). Figure 10.

Plants perennial, rhizomatous, rhizomes long and thin, stoloniform, from which several aerial shoots develop; culms terete, 15–40 cm, 0.8–1 mm diam., ascendent, generally branched at the basal nodes; internodes yellowish or brownish, finely striate, glabrous; nodes yellowish to brownish, slightly thickened, glabrous; floriferous culms terete, yellowish, longitudinally striate, hispid at the apex, otherwise glabrous. Sheaths longer than the internodes, finely striate, pale at the margins, glabrous; ligules 0.2–0.3 mm, membranous, the margin densely ciliate; pseudoligule absent; collar conspicuous, yellowish or reddish, strongly narrowed, glabrous; blades lanceolate, 4.5–7 $\times$ 0.5–0.6 cm, distichous, divergent, flat, slightly subcordate at the base, acute, longitudinally striate and glabrous on both surfaces, the margins scabrous. Inflorescence of 6 to 9 spiciform racemes 8–13 cm, divergent; main axis 4–6 cm, longitudinally sulcate, yellowish, scabrous at the angles, otherwise glabrous; rachis of the racemes near 0.2 mm wide, straight, yellowish, the angles hispidulous, without spikelets at the proximal portion. Spikelets fusiform, laterally compressed, 3–4.5 mm, 1-flowered, tight against the rachis, subsessile, alternate



Figure 10. *Gymnopogon glaber*. —A. Habit. —B. Inflorescence. —C. Portion of the rachis with a spikelet. —D. Spikelet detached from glumes. —E. Floret, dorsal view. —F. Floret, ventral view. —G. Palea with lodicules and caryopsis. —H. Caryopsis, scutellar view. —I. Caryopsis, hilum view. A–I drawn from A. Ragonese 131 (BA).

and distant in 2 series along the rachis; pedicels ca. 0.5–1 mm, slightly angular, hispid. Glumes subequal, lower glume 3–3.5 mm, upper glume 4–4.5 mm, longer than the florets, membranous, yellowish, glabrous, 1-nerved, the nerve conspicuous, greenish and scabrous, awnless; floret shortly stipitate, callus near 0.2 mm, thin, villous; lemma membranous, 2–3 mm, 3-nerved, the lateral nerves inconspicuous, shortly bifid at the apex, yellowish, glabrous, with a subapical awn 5–7 mm, straight or slightly curved, yellowish or violaceous, scabrous; palea membranous, pale, 2-nerved, equal to

the lemma, glabrous, scabrous on the nerves; rachilla prolonged behind the floret, terete, near 1 mm, glabrous, the apex ending in an awnlike rudiment ca. 1.5 mm, occasionally this rudiment also consisting of an infertile lemma. Caryopsis fusiform, near 2 mm, brownish, glabrous; embryo less than 1/3 the length of the caryopsis, hilum basal, punctiform.

Distribution and habitat. *Gymnopogon glaber* has been collected in northern Argentina, in the provinces of Jujuy, Salta, Tucumán, and Catamarca, in margins of forests between 1300 and 1800 m. The

taxon has been noted as flowering between February and April.

Observations. *Gymnopogon glaber* is morphologically similar to *G. grandiflorus*, the latter species having lemmas usually pubescent toward the base (vs. glabrous in *G. glaber*) and bigger florets (3.8–4.8 mm in *G. grandiflorus* vs. 2.5–3.5 mm in *G. glaber*).

Representative specimens examined. ARGENTINA. **Catamarca:** Ambato, camino de Singuil-Balcosna, 10 km E del cruce de rutas, Sierra de Graciana, *Saravia Toledo et al.* 13308 (CTES, NY). **Jujuy:** Dr. Manuel Belgrano, camino a Tiraxi, ruta prov. 29, *Zuloaga et al.* 8658 (SI). **Salta:** Guachipas, ruta nac. 9, Pampa Grande, *A. Hunziker* 1679 (BAA, CORD). **Tucumán:** Tafí, Siambón, *Díaz* 9601 (BAA); Siambón, *Olea* 64 a (BAA).

11. *Gymnopogon grandiflorus* Roseng., B. R. Arrill. & Izag., Bol. Fac. Agron. Univ. Montevideo 103: 20. 1968. TYPE: Uruguay. Dpto. Maldonado: Arroyo Solís, próx. a la barra, 8 Apr. 1955, *B. Rosengurt* B-6347 (holotype, MVFA not seen, MVFA photo at SI!; isotype, BAA!, BAA photo at US-2946505!). Figure 11.

Gymnopogon spicatus (Spreng.) Kuntze var. *brevisetus* Hack., Anales Mus. Nac. Buenos Aires 21 (ser. 3, 14): 117. 1911. *Gymnopogon brevisetus* (Hack.) J. P. Smith, Iowa State J. Sci. 45(3): 344. 1971. TYPE: Argentina. Buenos Aires: Est. Santa Rita, por Vela, 16 Apr. 1908, *T. Stuckert* 18744 (holotype, G not seen, G photo at SI!).

Plants perennial, rhizomatous, rhizomes short, occasionally long and stoloniform, from which several aerial shoots develop; culms terete, 25–45(–60) cm, 0.5–1.2 mm diam., slender, ascendent or decumbent, generally simple, rarely branched, erect to slightly geniculate at the basal nodes; internodes yellowish, finely striate, glabrous; nodes inconspicuous, slightly thickened or compressed, glabrous; floriferous culms terete, yellowish, longitudinally striate and hispid at the apex, otherwise glabrous. Sheaths longer than the internodes, finely striate, yellowish, pale toward the margins, glabrous; ligules ca. 0.5 mm, membranous, the margin densely ciliate; pseudoligule absent; collar conspicuous, yellowish to reddish, strongly narrowed, glabrous; blades lanceolate, 5–8(–10) × 0.3–0.5 cm, distichous, ascendent, flat, subcordate at the base, acute, longitudinally striate and glabrous on both surfaces, the margins hispid and slightly involute at the apex. Inflorescence of 6 to 13 spiciform racemes 10–15 cm, partially included in the upper sheath, divergent; main axis (3–)5–9 cm, longitudinally sulcate, yellowish, scabrous at the angles, otherwise glabrous; rachis of the racemes 0.1–0.3 mm wide, slightly sinuous, yellowish green, the angles hispidulous, otherwise glabrous, without

spikelets at the proximal portion. Spikelets fusiform, laterally compressed, 3.5–5.5 mm, 1- or 2-flowered, tight against the rachis, subsessile, alternate and distant in 2 series along the rachis; pedicels ca. 0.5 mm, terete, hispid. Glumes subequal, lower glume 3.5–5 mm, upper glume 4.5–5.5 mm, longer than the florets, membranous, violaceous, glabrous, 1-nerved, the nerve conspicuous, yellowish and scabrous, otherwise glabrous, with margins scabrous, awnless; lower floret shortly stipitate, callus near 0.8 mm, thin, hispid; lemma membranous, 3.5–4(–5.5) mm, 3-nerved, the nerves inconspicuous, shortly bifid and lacinate at the apex, yellowish, glabrous, usually pubescent basally, with a subapical awn 5.5–9(–12) mm, straight or slightly geniculate, yellowish or violaceous, hispid; palea membranous, pale, 2-nerved, equal to the lemma, minutely lacinate at the apex, glabrous; rachilla prolonged behind the floret, terete, near 1 mm, scabrous, the apex ending in an awnlike rudiment 0.8–3 mm, scabrous. Caryopsis fusiform 2.4–3 mm, brownish or violaceous; embryo less than 1/3 the length of the caryopsis, hilum basal, punctiform.

Distribution and habitat. *Gymnopogon grandiflorus* grows in Uruguay, Brazil, and Argentina, and Smith (1971) cited this species for Peru. It grows in open fields on sandy or clay soils and has been reported to flower between February and May.

Observations. The specimens *Swallen* 9201 and 9235 (NY), collected in Rio Grande do Sul, Brazil, have florets 3–3.5 mm, smaller than those typically seen in *Gymnopogon grandiflorus*, with the lemma lacking the basal pubescence and completely glabrous, characters that place both specimens near *G. glaber*. However, the latter species has even smaller florets, 2–2.5 mm, and has been collected only from northern Argentina to date.

Within the specimens examined, a gradation in lemma pubescence could be observed, from glabrous to villous in different portions. *Gymnopogon grandiflorus* is morphologically similar to *G. glaber* (see observation under the latter species).

Representative specimens examined. ARGENTINA. **Buenos Aires:** Saavedra, Sierra Curumalán, 20 Mar. 1918, *Hauman* s.n. (BAA 5338). **Córdoba:** Calamuchita, Los Reartes, *Sayago* 3075 (BAA). **Entre Ríos:** Gualaguaychú, Paranacito, *Martínez Crovetto* 5019 (BAB). BRAZIL. **Rio Grande do Sul:** Bagé, *Swallen* 9049 (NY). URUGUAY. **Florida:** Campo Exp. de pastos, Ea. Rincón de Santa Elena, *Gallinal & Rosengurt* PE-6034 (BAA, SI).

12. *Gymnopogon legrandii* Roseng., B. R. Arrill. & Izag., Bol. Fac. Agron. Univ. Montevideo 103: 22. 1968. TYPE: Uruguay. Canelones: Carrasco,



Figure 11. *Gymnopogon grandiflorus*. —A. Habit. —B. Portion of the rachis with a 1-flowered spikelet. —C, D. Two-flowered spikelets from the proximal floriferous portion of the rachis and the distal portion of it, respectively. —E. Two-flowered spikelet detached from glumes. A–E drawn from *Venturi 10245* (NY).

Aeropuerto, en arenas, 4 Mar. 1949, *B. Rosengurtt B-5291* (holotype, MVFA not seen, MVFA photo at SI!; isotypes, BAA-1386!, SI!, US not seen). Figure 12.

Gymnopogon biflorus Pilg. var. *ciliatillemma* Burkart, Bol. Soc. Argent. Bot. 12: 290. 1968. TYPE: Argentina.

Entre Ríos: Dpto. Gualeguaychú, predelta, Ibicuy, 4 Dec. 1930, *A. Burkart 3598* (holotype, SI!; isotype, SI!).

Gymnopogon swallenii J. P. Smith, Iowa State J. Sci. 45(3): 373. 1971. TYPE: Brazil. Rio Grande do Sul: Rio Grande, 3 May 1946, *J. R. Swallen 9235* (holotype, US-1960896 not seen, US photo at SI!; isotype, US-3135306 not seen, US photo at SI!).



Figure 12. *Gymnopogon legrandii*. —A. Habit. —B. Spikelet. —C. Spikelet detached from glumes, lateral view. —D. Spikelet detached from glumes, ventral view. —E. Floret. A–E drawn from *Pedersen 1730* (NY).

Plants perennial, rhizomatous, rhizomes stoloniform, thin (2–3 mm diam.), yellowish, glabrous, from which several aerial shoots develop; culms terete, 30–60 cm, slender, ascendent or decumbent, simple, erect; internodes yellowish, inconspicuously striate,

glabrous; nodes inconspicuous, slightly thickened, yellowish, glabrous; floriferous culms terete, yellowish, longitudinally striate and hispid at the apex, otherwise glabrous. Sheaths longer than the internodes, finely striate, yellowish, pale toward the

margins, glabrous; ligules 0.6–0.8 mm, membranous, the margin densely ciliate; pseudoligule absent; collar inconspicuous, whitish to reddish, strongly narrowed, glabrous, occasionally villous at the margins; blades oblong-lanceolate, 2.6–5(–10) × 0.2–0.6 cm, distichous, ascendent or divergent, flat, subcordate at the base, acute, longitudinally striate and glabrous on both surfaces, rarely somewhat hispid, the margins hispid and slightly involute at the apex. Inflorescence of 4 to 14 spiciform racemes (7–) 10–17(–19) cm, divergent, violaceous; main axis 10–12 cm, longitudinally sulcate, yellowish, scabrous at the angles, otherwise glabrous; rachis of the racemes 0.3–0.8 mm wide, straight, yellow greenish, the angles hispidulous, with hairs all over the surface near the base, otherwise glabrous, with reduced spikelets at the base. Spikelets fusiform, laterally compressed, 3–6 mm, 1- or 2-flowered, tight against the rachis, subsessile, alternate and distant in 2 series along the rachis; pedicels ca. 0.3–0.8 mm, terete, slightly flattened, scabrous. Glumes subequal, lower glume 3–5 mm, upper glume 4–6 mm, longer than the florets, membranous, yellowish tinged with violet, glabrous, 1-nerved, the nerve conspicuous, yellowish and scabrous, otherwise glabrous, with margins scabrous, awnless; lower floret shortly stipitate, callus near 0.2 mm, thick, densely villous; lower floret with lemma membranous, 2.5–3 mm, 3-nerved, the nerves inconspicuous, shortly bifid at the apex, violaceous at the base, otherwise yellowish, villous toward the margins and the base, glabrous on the rest of the surface, with a subapical awn 3–3.5(–7) mm, straight, yellowish, hispid; palea membranous, pale, 2-nerved, equal to the lemma, minutely lacinate at the apex, glabrous; upper floret when present similar to the lower one but smaller; rachilla prolonged behind the floret, terete, near 1 mm, scabrous, the apex ending in an awnlike rudiment 1–2.5 mm, scabrous. Caryopsis fusiform 2–2.2 mm, brownish; embryo less than 1/3 the length of the caryopsis, hilum basal, punctiform.

Distribution and habitat. *Gymnopogon legrandii* has been collected in Brazil, Uruguay, and Argentina, in open, sandy soils and in flower between November and May.

Observation. *Gymnopogon legrandii* is clearly differentiated from the rest of the species of the genus by a combination of two unique characters: by the presence of long stoloniform rhizomes and by having reduced spikelets at the base of the spiciform racemes.

Representative specimens examined. ARGENTINA. **Córdoba:** Punilla, Sierra Grande, falda E, ca. de la entrada

a la Ea. San Bernardo, A. Hunziker 12038 (BAA, CORD). **Corrientes:** Goya, ruta 12, 40 km S de Goya, Krapovickas *et al.* 27255 (CTES). **Entre Ríos:** Gualeguaychú, de Ceibas a Médanos, Troncoso *et al.* 3248 (SI); Gualeguaychú, Holt, Martínez Crovetto 2191 (SI). **Misiones:** San Ignacio, campo antes de la entrada al Parque Prov. Teyucuaré, 27°16'S 55°33'W, Zuloaga *et al.* 5747 (SI).

13. *Gymnopogon spicatus* (Spreng.) Kuntze, Revis. Gen. Pl. 3(3): 354. 1898. Basionym: *Polypogon spicatus* Spreng., Syst. Veg. (ed. 16) [Sprengel] 1: 243. 1824. *Trichochloa spicata* (Spreng.) Schult., Mant. 3 (Schultes & Schultes f.): 577. 1827. *Muhlenbergia spicata* (Spreng.) Kunth, Révis. Gramin. 1: 64. 1829. TYPE: Brazil. S. loc., s.d., *F. Sellow s.n.* (holotype, B not seen; isotype, B fragm. at BAA!, B fragm. at US not seen). Figure 13.

Gymnopogon biflorus Pilg., Bot. Jahrb. Syst. 30(1): 139–140. 1901. TYPE: Brazil. Mato Grosso: “auf trockenem, steinigem Boden im Oberen Cuyabathal,” Apr. 1899, *H. Meyer* 489 (holotype, B not seen; isotype, B fragm. at BAA!).

Gymnopogon laevis Nees, Fl. Bras. Enum. Pl. 2(1): 428. 1829. TYPE: [Uruguay]. “Habitat ad Monte Video,” s.d., *F. Sellow s.n.* (holotype, B not seen; isotypes, L-12088 not seen, B fragm. at US!).

Gymnopogon laevis Nees var. *pluriflorus* Döll, Fl. Bras. (Martius) 2(3): 81. 1878. *Gymnopogon spicatus* (Spreng.) Kuntze var. *pluriflorus* (Döll) Stuck., Anales Mus. Nac. Buenos Aires 21: 117. 1911. *Gymnopogon spicatus* var. *pluriflorus* (Döll) Parodi, Physis (Buenos Aires) 4: 174. 1918, nom. illeg. *Gymnopogon spicatus* (Spreng.) Kuntze var. *pluriflorus* (Döll) Rojas, Revista Jard. Bot. Mus. Hist. Nat. Paraguay 2: 170. 1923, nom. superfl. TYPE: Brazil. “Prope Ypanema,” s.d., *J. G. F. Riedel s.n.* (holotype, W not seen).

Gymnopogon filiformis Griseb., Fl. Brit. W.I. [Grisebach] 538. 1864. TYPE: Trinidad. S. loc., s.d., *Crueger s.n.* (holotype, GOET not seen; isotypes, B not seen, US-822349 photo at SI!).

Gymnopogon spicatus (Spreng.) Kuntze var. *longiaristatus* Kuntze, Revis. Gen. Pl. 1: 354. 1891. *Gymnopogon spicatus* (Spreng.) Kuntze f. *longiaristatus* (Kuntze) J. P. Smith, Iowa State J. Sci. 45(3): 371. 1971. TYPE: Bolivia. Ost-Velasco, 200 m, July 1892, *O. Kuntze s.n.* (lectotype, designated by Smith [1971: 372], NY not seen, NY photo at SI!).

Plants caespitose, perennial, rhizomatous, rhizomes thickened and short, yellowish, glabrous, from which several aerial shoots develop; culms terete, 30–100 cm, 1–2 mm diam., ascendent or decumbent, simple or branched, erect; internodes yellowish to brownish, inconspicuously striate, glabrous; nodes inconspicuous, slightly thickened, yellowish, glabrous; floriferous culms terete, yellowish, longitudinally striate and hispid at the apex, otherwise glabrous. Sheaths shorter than the internodes, finely striate, yellowish, generally villous toward the margins and collar, otherwise glabrous;



Figure 13. *Gymnopogon spicatus*. —A. Habit. —B. Inflorescence. —C. Spikelet without glumes. —D, E. Two-flowered spikelets from the proximal floriferous portion of the rachis and the distal portion of it, respectively. A–E drawn from Killeen 2481 (SI).

ligules 0.1–0.4 mm, membranous, the margin densely ciliate; pseudoligule a ring of hairs ca. 2 mm; collar conspicuous, yellowish, strongly narrowed, densely villous, sometimes only villous at the margins; blades broadly lanceolate, (1.5–)2.8–6(–9) × 0.2–1.2 cm, distichous, ascendent or divergent,

flat or convolute, rigid, subcordate or truncated at the base, acuminate, longitudinally striate and glabrous on both surfaces, with scabrous margins. Inflorescence of 6 to 35 spiciform racemes 4.5–33 cm, ascendent or divergent; main axis 9–16 cm, longitudinally sulcate, yellowish, scabrous at the

angles, otherwise glabrous; rachis of the racemes 0.2–0.3 mm wide, straight, yellowish, the angles pilose, otherwise glabrous, floriferous from the base, generally with reduced and distant spikelets at the proximal portion and developed spikelets conspicuously dense at the distal part of the rachis. Spikelets fusiform, laterally compressed, (2.5–)3–8.4 mm, 1- or 2(to 3)-flowered, tight against the rachis, shortly pedicellate, alternate or opposite at the apex in 2 series along the rachis; pedicels 1–1.2 mm, slightly flattened, scabrous. Glumes subequal, lower glume (2.5–)3–7.5 mm, upper glume 3.5–8.4 mm, longer than the florets, membranous, yellowish, glabrous, 1-nerved, the nerve prolonged in an awnlike acumen 0.5–2.5(–3) mm, scabrous, on both or one of the glumes; lower floret subsessile, callus obliquely truncate, pubescent; lemma membranous, 2.2–4 mm, 3-nerved, the nerves inconspicuous, with white hairs 0.2–1 mm on the surface and margins, occasionally glabrous, shortly bifid at the apex, with a subapical awn (4–)9–15(–30) mm, straight or slightly curved, yellowish, hispid; palea membranous, pale, 2-nerved, 2–3 mm, minutely lacinate at the apex, pubescent on the surface and margins; upper floret similar to the lower one but smaller; rachilla prolonged behind the floret, terete, 0.5–2 mm, scabrous, the apex ending in an awnlike rudiment 2–5(–7) mm, scabrous. Caryopsis fusiform, 1–2.4 mm, brownish; embryo less than 1/3 the length of the caryopsis, hilum basal, punctiform.

Distribution and habitat. *Gymnopogon spicatus* is distributed in the southern United States, in Mexico, Belize, and Guatemala in Mesoamerica, and in Colombia, Venezuela, Brazil, Bolivia, Peru, Paraguay, Uruguay, and Argentina in South America. The species has been collected from sea level to 2300 m, with flowering noted between December and June.

Observations. Smith (1971) placed *Gymnopogon biflorus* under the synonymy of *G. spicatus* and mentioned the presence of conspicuously acuminate glumes, but not awned, for this species; he also mentioned that *G. aristiglumis* is the only species of the genus that has awned glumes. Caro (1982), in his revision of the Argentinean species of *Gymnopogon*, considered *G. spicatus* and *G. biflorus* as separate, valid species, both with glumes attenuated into awns; he distinguished them by the number of fertile florets within the spikelets and the indument of the lemma. For *G. spicatus*, Boechat and Valls (1990b) described the presence of awns 0.5–3.5(–5.5) mm on one or both glumes, but they did not consider this character to identify the taxon in the key to species of Brazil. In the present

contribution, *G. spicatus* and *G. aristiglumis* are both considered with awned glumes, although in *G. spicatus* the awn is short, 0.5–2.5(–3) mm, and is better considered as an awnlike acumen (see observation under *G. aristiglumis*). *Gymnopogon spicatus* is one of the most frequently encountered species of the genus in Central and South America. However, it is of little economic value, probably due to its rigid blades. This is a variable species, regarding reproductive characters of the spikelets, such as the number of florets, the length of the glumes and lemmas, and the length of the awns. This variation led the authors to recognize varieties or forms within the species, which are here placed under synonymy.

Representative specimens examined. ARGENTINA. **Chaco:** Iro. De Mayo, Colonia Benítez, *Schulz* 3213 (CTES, SI). **Córdoba:** Calamuchita, Valle de los Reartes, *Castellanos* 3361 (BAA). **Corrientes:** Bella Vista, barrancas arenosas del río Paraná, *Boelcke* 1596 (BAA, SI). **Entre Ríos:** Concordia, Est. Agronómica, *Burkart* 910 (BAA). **Formosa:** Patiño, Estanislao del Campo, *Schulz* 13975 (BAA, CTES). **Jujuy:** S. loc., *Parodi* 9785 (BAA). **Misiones:** San Ignacio, *Quiroga* 793 (BAA). **Salta:** Santa Victoria, Los Toldos, ladera E del Cerro, *Meyer et al.* 20585 (BAA). **San Luis:** Pringles, Loma Alta, entre Santo Domingo y Paso del Rey, *Anderson* 3534 (CORD). **Tucumán:** Trancas, *Venturi* 6761 (NY). BELIZE. All Pines, *Schipp* 787 (BM, NY). BOLIVIA. **Chuquisaca:** Azurduy, on ascent above Tarvita to Cerro Viscachani on rd. to Azurduy, *Wood & Serrano* 14470 (LPB). **Santa Cruz:** Andrés Ibañez, Viru-Viru Int. Airport, SW of bldgs., *Nee* 44332 (NY). **Tarija:** José María Aviléz, Antigal, *Beck* 27309 (LPB). BRAZIL. **Bahia:** wet campo, Rio Piau, ca. 150 km SW of Barreiras, *Irwin et al.* 14750 (NY). **Distrito Federal:** 31 km from Brasília on Anapolis rd., *Clayton* 4817 (NY). **Goiás:** Corumbá de Goiás, GO-Serra dos Pirineus, 10 km NW Cocalzinho, *Burman & Filgueiras* 407 (NY). **Mato Grosso:** Nova Andradina, Casa Branca, *Hatschbach* 31872 (NY). **Mato Grosso do Sul:** Bonito, terr. of Ponta Porã, *Swallen* 9514 (NY); Campo Grande, *Chase* 10827 (NY). **Minas Gerais:** Ouro Preto (Villa Rica), *Chase* 9357 (NY). **Paraíba:** near João Pessoa, along Rte. BR-101, *Tsugaru & Sano* B-1310 (NY). **Paraná:** 12 km SW of Jaguaraiá along hwy. PR-11 to Ponta Grossa, *Davidse et al.* 11381 (NY). **Rio Grande do Norte:** Paul dos Ferros, Sítio Mororó, *Santino de Assis & Sarmiento* 388 (NY). **Rio Grande do Sul:** Pelotas, *da Costa Sacco* 102 (BAA). **São Paulo:** Casa Branca, *Chase* 10587 (BAA). COLOMBIA. **Magdalena:** Santa Marta, *H. H. Smith* 189 (BM, NY). **Tolima:** Honda, *Pennell* 3650 (NY). GUATEMALA. **Izabal:** Los Amates, *Weatherwax* 1753 (BM). MEXICO. **Veracruz:** Azueta, *Archer* 3955 (BM). PARAGUAY. **Alto Paraguay:** San Salvador, *Rojas* 2767 (SI). **Amambay:** Cabecera Aquidabán, *Rojas* 6615 (BAA); Parque Nac. Cerro Corá, camino lateral entre la Ruta 5 y el área de admin., *Morrone & Pensiero* 442 (SI). **Boquerón:** Puerto Sastre, *Ramírez* 16 (SI). **Central:** Villeta, Alemán Cué, *Rosengurt* B-5548 (BAA). **Cordillera:** 3 km camino a Paraguari, *Morrone & Pensiero* 109 (SI). **Paraguari:** Caapucú, Barrerito, *Rosengurt* B-5614 (BAA). **Presidente Hayes:** Gran Chaco, Santa Elisa, *Hassler* 2696 (BM, NY).

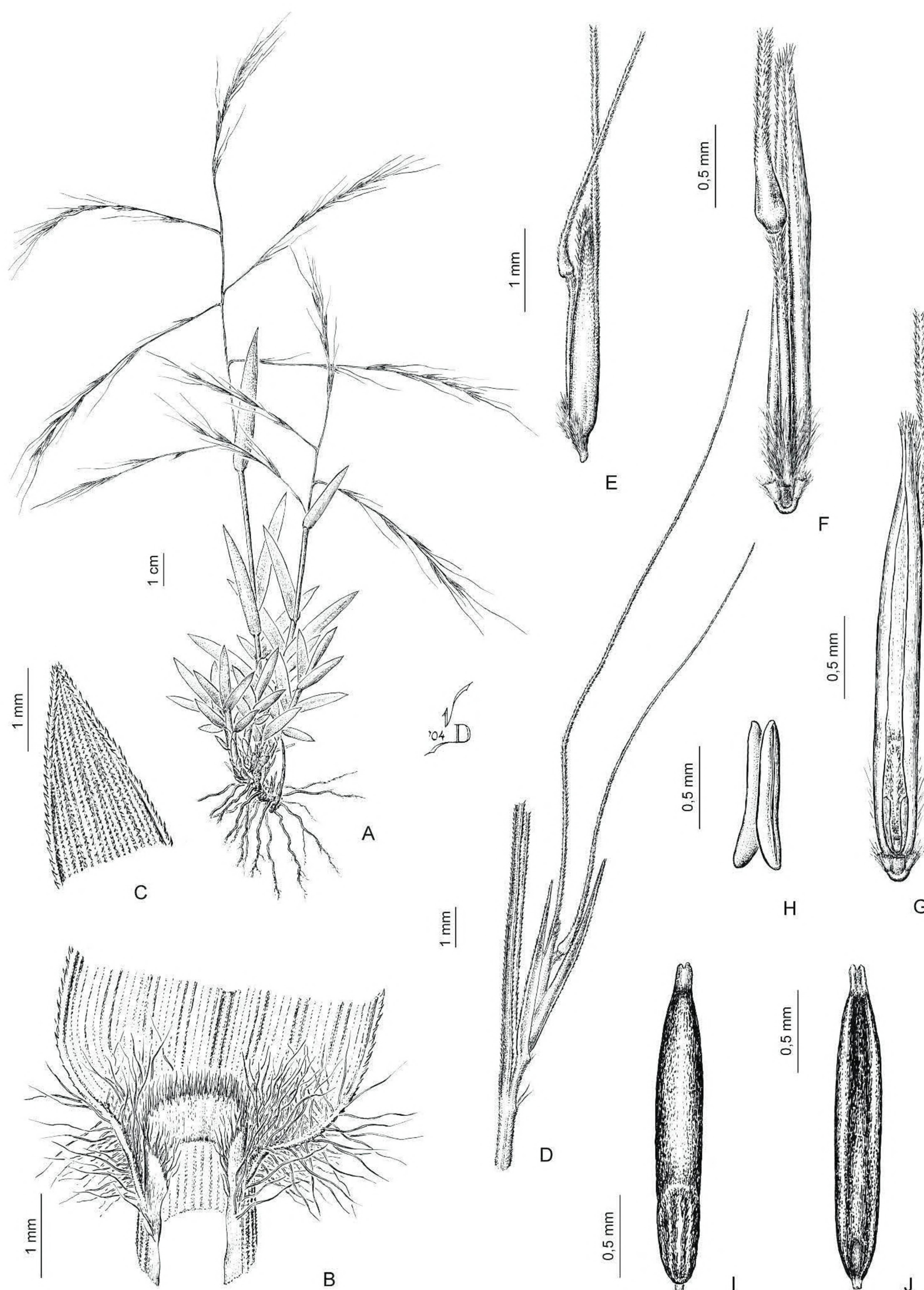


Figure 14. *Gymnopogon toldensis*. —A. Habit. —B. Ligule. —C. Blade apex. —D. Portion of the rachis with one spikelet. —E. Floret, lateral view. —F. Floret, ventral view. —G. Floret, ventral view detached from rachilla. —H. Stamen. —I. Caryopsis, scutellar view. —J. Caryopsis, hilum view. A–J drawn from *Sulekic et al.* 810 (SI).

San Pedro: San Estanislao, Jan. 1946, *Bridarolli s.n.* (SI). **PERU. Lambayeque:** Sapotal, *Llatas Quiroz* 684 (NY). **URUGUAY. Colonia:** Nueva Palmira, Río Uruguay, *Morrone et al.* 5228 (SI). **VENEZUELA. Lara:** Barquisimeto, Loma de León, *Burkart* 17128 (SI). **Miranda:** path from Petare to La Guayrita, *Alston* 5487 (BM, NY).

Monagas: sabanas de Cachipo, *Tamayo* 3566 (SI). **Trujillo:** Sabana de Monay, *Burkart* 16843 (SI).

14. *Gymnopogon toldensis* Sulekic & Rúgolo, *Darwiniana* 44(2): 504–507. 2006. TYPE: Argentina. Salta: Depto. Santa Victoria, El

Angosto, 5 km E de Los Toldos, 1600 m, 17 Mar. 1986, A. Sulekic, L. Novara & G. Neumann 810 (holotype, SI!; isotype, Herb. Sulekic not seen). Figure 14.

Plants perennial, rhizomatous, rhizomes thickened and shorter than 1.5 cm, yellowish, glabrous, from which several aerial shoots develop; culms terete, (5–) 15–25 cm, 3–4 mm diam., slender, ascendent, simple, erect; internodes yellowish, inconspicuously striate, glabrous; nodes inconspicuous, slightly thickened, brownish, glabrous; floriferous culms terete, yellowish, longitudinally striate and hispid at the apex, otherwise glabrous. Sheaths longer than the internodes, finely striate, yellowish, pubescent, the margins densely pilose toward the collar, otherwise glabrous; ligules 0.5–0.8 mm, membranous, the margin densely ciliate; pseudoligule absent; collar inconspicuous, slightly darker, strongly narrowed, with macrohairs up to 2 mm at the margins, otherwise glabrous; blades oblong-lanceolate, (0.8–)2–5.5 × (0.15–)0.3–0.5 cm, distichous, ascendent, flat, convolute at the apex, truncated at the base, acute, longitudinally striate and glabrous on both surfaces, the margins hispid, glabrous. Inflorescence of 5 or 6 spiciform racemes 3–6.5 cm, divergent, yellowish; main axis 2–4 cm, slightly flattened, yellowish, scabrous at the angles, otherwise glabrous; rachis of the racemes 0.3–0.5 mm wide, straight or slightly sinuous, yellowish, the angles hispidulous near the base, otherwise glabrous, without spikelets at the basal 1/4. Spikelets fusiform, laterally compressed, 3–6 mm, 1-flowered, tight against the rachis, subsessile, alternate and distant in 2 series along the rachis; pedicels 0.7–0.8 mm, terete, slightly flattened, scabrous. Glumes subequal, lower glume ca. 3 mm, upper glume 3–6 mm, longer than the florets, membranous, yellowish, glabrous, 1-nerved, the nerve conspicuous, yellowish and scabrous on the nerve, awnless; floret shortly stipitate, callus near 0.2 mm, thick, densely villous; lemma membranous, 2.5–3 mm, 3-nerved, the nerves inconspicuous, shortly bifid at the apex, yellowish, with few hairs toward the margins, with a subapical awn (18–)24–25(–33) mm, straight or geniculate, yellowish, hispid; palea membranous, pale, 2-nerved, equal to the lemma, minutely laciniate at the apex, glabrous; rachilla prolonged behind the floret, terete, 1–1.5 mm, scabrous, the apex ending in an awnlike rudiment 5–15(–18) mm, scabrous. Caryopsis fusiform, ca. 1.8 mm, brownish red; embryo less than 1/3 the length of the caryopsis, hilum basal, punctiform.

Distribution and habitat. *Gymnopogon toldensis* is only known from the type collection in Salta, Argentina, on stony slopes.

Observations. *Gymnopogon toldensis* is related to *G. brevifolius*, *G. grandiflorus*, and *G. glaber*, as they share a lack of spikelets at the base of the branches of the inflorescence; however, the presence of long awns, longer than 18 mm, and ligules 0.5–0.8 mm distinguishes *G. toldensis* from the aforementioned species.

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APPENDIX 1. Examined material of *Gymnopogon*. Each specimen is cited by the last name of the first collector when there is more than one collector. Species number is indicated between parentheses and corresponds to the list of species.

1. *Gymnopogon ambiguus* (Michx.) Britton, Sterns & Poggenb.
2. *Gymnopogon aristiglumis* Hitchc.
3. *Gymnopogon brevifolius* Trin.
4. *Gymnopogon burchellii* (Munro ex Döll) Ekman
5. *Gymnopogon chapmanianus* Hitchc.
6. *Gymnopogon delicatulus* (C. B. Clarke ex Hook. f.) Bor
7. *Gymnopogon doellii* Boechat & Valls
8. *Gymnopogon fastigiatus* Nees
- 8a. *Gymnopogon fastigiatus* Nees subsp. *fastigiatus*
- 8b. *Gymnopogon fastigiatus* Nees subsp. *jubiflorus* (Hitchc.) J. P. Smith
9. *Gymnopogon foliosus* (Willd.) Nees
10. *Gymnopogon glaber* Caro
11. *Gymnopogon grandiflorus* Roseng., B. R. Arrill. & Izag.
12. *Gymnopogon legrandii* Roseng., B. R. Arrill. & Izag.
13. *Gymnopogon spicatus* (Spreng.) Kuntze
14. *Gymnopogon toldensis* Sulekic & Rúgolo

Ahles 36570 (3); Ahumada 4010 (12); Allison 9547 (3); Alston 5487 (13); Amaral 991 (9); Anderson 3534 (13), 8251 (9), 9322 (9), 9336 (9), 9701 (9), 9973 (9), 10276 (9), 37075 (9); Araújo 63 (13), 108 (13); Arbo 927 (13); Archer 3955 (13); Athey 2186 (1).

Ball 80 (1); Batson Jr. 386 (3); Beck 2039 (8b), 23469 (13), 24152 (8b), 27309 (13); Bianchetti 1516 (7); Biganzoli 26 (13); Biltmore 475c (1); Blake 9748 (1); Blomquist 10159 (1), s.n. (3); Boelcke 1596 (13); Bordón 344 (13), s.n. (13); Bridarolli s.n. (13); Britton 7955 (9); Bromquist 238 (3); Burkart 910 (13), 3598 (12), 16843 (13), 17128 (13), 21637 (13); Burman 407 (13), 419 (9); Bush 1340 (1), 7883 (1).

Cabrera 32419 (4); Calderón 949 (2), 2072 (2); Canby 290 (3), 14981 (1), 15158 (3), s.n. (3); Carnevali 475 (4), 1076 (4), 3185 (4), 4249 (13), 5529 (13), 5987 (12); Castellanos 3361

(13); Chapman s.n. (3); Charoenphol 4934 (6); Chase 8002 (9), 8396 (1), 8762 (4), 9357 (13), 10587 (13), 10827 (13), 10962 (4), 11779 (9), 12004 (9), 12060 (9), 12108 (9), 12206 (1), s.n. (9); Cimbra 140 (13); Clayton 4817 (13); Coile 1582 (1); Commons s.n. (3); Coradin 759 (9); da Costa Sacco 102 (13); Cowan 4115 (13); Cristóbal 1123 (13); Curtiss 3441 p.p. (1), 3441 p.p. (5), 3442 (3), 4062 (3), 5246 (5), 6262 (5), s.n. (1). Davidse 2810 (9), 4424 (9), 4928 (9), 4973 (9), 5179a (8a), 11081 (4), 11381 (13), 12145 (9), 12200 (9), 12233 (9), 22611 (9), 22645 (9), 23119 (9), 23126 (9); Davis 57 (9); de La Cruz 1701 (9); Desvaux s.n. (9); Díaz 9601 (10); Dusén 4120 (13).

Earle s.n. (1), s.n. (3); Eggert s.n. (1); Eiten 2697 (9), 4159 (9); Ekman 701 (4), H 13538 (1); Elcoro 576 (9); Ellendale s.n. (3).

Fernald 15175 (3); Fredholm 6207 (5).

Gallinal PE-6034 (11); Gatingen s.n. (1), s.n. (3); Gehrt 8308 (9); Gillespie 752 (9); Glaziou 20099 (9), s.n. (9); Gleason 531 (9); Glocker 268 (9); Godfrey 1597 (1), 8094 (1); Goodland 332 (9), 401 (9), 842 (9).

H. L. B. 776 (3); Hale s.n. (3); Harley 21759 (9); Harper 2252 (3), s.n. (1); Hassler 2696 (13), 12900 (13); Hatschbach 3010 (4), 31872 (13), 64845 (9), 64877 (9); Hauman s.n. (11); Hermann 14997 (1); Herndon 277 (1); Hill 15844 (3), 22699 (3), 24537 (3); Hitchcock 660 (1), 906 (1), 17273 (9); Hoehne 17548 (13); Holdridge 1215 (1), 1715 (1); Holm s.n. (1); Hooch 1151 (9); Hostmann 1003 (9); Howard 8138 (1); Huber 4576 (8a), 4770 (9), 10272 (9); Hunt 5616 (9), 5905 (8a); Hunziker, A. 1679 (10), 12038 (12), 21195 (10).

Ibarrola 2040 (13), 2388 (12), 2904 (13); Irwin 13073a (4), 14118 (13), 14474 (9), 14568 (9), 14750 (13), 14933 (9), 15315 (9), 15940 (8a), 16072 (9), 16429 (8a), 17085 (8a), 17303 (8a), 28355 (9), 34838 (13).

Jardim 3643 (9); Jenman 2246 (9), 5993 (9); Jiménez 13477 (4), 14641 (4).

Kearney Jr 5 (1); Kerr 156103 (6); Killeen 924 (13), 1029 (8a), 1248 (13), 1567 (13), 1990 (13), 2017 (13), 2039 (8a), 2077 (8b), 2092 (13), 2481 (13), 2588 (8b); Killip 30070 (9); Koster C5206-1 (1); Kral 44183 (3), 69705 (1); Krapovickas 20907 (13), 27255 (12), 31745 (13), 40798 (4); Kurz 1175 (6).

Letterman s.n. (1); Linden 1564 (9); Liogier 12778 (1); Lippincott s.n. (3); Llatas Quiroz 684 (13); Long 13590 (3); Longhi-Wagner 9518 (4); Lorente 1802 (13).

Maas 3678 (9); Machado de Campos 205 (13); Mackenzie 6700 (3), s.n. (1); Martinelli 6914 (9); Martínez Crovetto 2191 (12), 5019 (11), 10543 (13); Martins s.n. (7); McArdle 424 (1); McGee 1384 (1); Mendes Magalhães 19192 (9); Mexía 5853a (9); Meyer 489 (13), 797 (13), 2183 (13), 2294 (4), 20585 (13); Mimura 354 D (9); Morrone 80 (13), 109 (13), 442 (13), 518 (13), 5228 (13); Mroginski 485 (4); Murca Pires 52166 (9).

Nee 41102 (8a), 41330 (8a), 44332 (13), 46119 (13); Nicora 385 (13); Nuttall s.n. (1).

Oldenburger 431 (9); Olea 64 a (10).

Palmer 8876 (3), 29129 (3), 32740 (1); Parodi 3643 (13), 4542 (4), 5449 (4), 9785 (13), 12062 (13), 12137 (13), s.n. (9); Pedersen 1730 (12); Pennell 3650 (13); Pinto 48/86 (9); Pires 51064 (9); Pittier 10599 (9); Pontious 34 (1); Potzger 10649 (1); Prance 13816 (8a), 23530 (9); Pulle 362 (9).

Quiroga 793 (13).

Ragonese, A. 131 (10), 6747 (4); Ramírez 16 (13); Ratter 2080 (9); Reverchon s.n. (1), 1146 (1); Ridley s.n. (9); Riedel s.n. (9); Rodrigues 4535 (9); Rojas 2767 (13), 6615 (13), 13174 (4), 13252 (4); Rosa 1870 (9); Rosengurtt B-5291 (12), B-5548 (13), B-5614 (13), B-6347 (10); Rua 515 (13); Rugel 699 (1).

Santino de Assis 388 (13); *Saravia Toledo* 13308 (10); *Sayago* 3075 (11); *Schinini* 14598 (13), 17497 (12), 36048 (13); *Schipp* 787 (13); *Schnell* 9489 (9); *Schulz* 1055 (4), 3213 (13), 3237 (4), 3844 (4), 11516 (4), 12652 (13), 13975 (13), 17059 (13), 18812 (13); *Seitz s.n.* (9); *Serrano* 881 (13); *Small* 1030 (5), 9388 (3), *s.n.* (1); *Smith* 189 (13), 2474 (1), 2475 (3), 2578 (3), 10530 (4), 12095 (4); *Spruce s.n.* (9); *Steinbach* 1932 (13); *Steyermack* 59203 (9), 131192 (9); *Stone s.n.* (3); *Stuckert* 580 (13), 2644 (13), 14164 (13), 18744 (10); *Sulekic* 810 (14), 1850 (10); *Sundell* 6868 (1); *Swallen* 1247 (5), 3939 (9), 8385 (4), 8688 (13), 9049 (11), 9201 (11), 9235 (11), 9514 (13), 9519 (13).

Tamayo 3037 (9), 3095 (9), 3566 (13); *Taylor* E1296 (9); *Thomas* 103070 (3), 142049 (1), 147645 (1), 151215 (1), 155696 (1), 168916 (1); *Tracy* 1385 (1), 4538 (3), 7102 (5), 7764 (1), 7766 (1), 8292 (1), *s.n.* (3); *Troncoso* 3248 (12); *Tsugaru B-1310* (13).

Vallejo 57 (4); *Van der Sluijs* 1435 (13); *Venturi* 6761 (13), 10245 (11).

Walker 3222 (1); *Weatherwax* 1753 (13); *Williamson s.n.* (1); *Wood* 7993 (13), 14470 (13); *Wurdack* 39806 (9), 41113 (8a).

Zuloaga 5747 (12), 8658 (10).